GAS JOURNAL

LIGHT ✂ HEAT ✂ POWER ✂ BYE-PRODUCTS

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VOL. CLXXXVIII. No. 3465.] WEDNESDAY, OCTOBER 16, 1929 [81ST YEAR.

Editorial Notes.

Difficulties of the Small Works.

AT a time when, in so many directions, industrial concerns tend to grow larger, the question of amalgamation is very much in the air in the gas industry—indeed, according to some, it remains "in the air" to a greater extent than the best interests of the industry demand. It is a matter, however, about which there has been a good deal done and a great deal said; and progress is being made, even if only at a slow rate.

Like most questions, that of amalgamation has its two sides, and must be decided on the balance of advantage; the balance of advantage lying with the cheapest gas and the best service, with all that it implies. These are the two weapons in which the gas industry has to place its faith; and they must be sought wherever they are to be found. If they are to be obtained in amalgamation, that does not necessarily imply insufficiency either on the part of the small gas-works or of the "small" manager. Both have performed yeoman service to the industry; and the handicaps, which they have too often suffered, confer merit upon their accomplishments. But times change; and what met the circumstances of yesterday will be totally inadequate to fill the needs of to-morrow. This can be taken as applying to our industry, which is faced with increasing efforts on the part of other claimants to popular favour.

As has already been remarked, if the gas industry is to continue to progress, cheap gas and good service are essential; and these are among the advantages that Mr. E. W. Bonsey, in a paper submitted at last week's meeting of the Eastern Counties Gas Managers' Association, urges are to be reaped by small gas undertakings through being controlled by a larger company. Really, it is not correct to say "among," for all the advantages affect in some way one or other of these two aims. Mr. Bonsey is able to speak from experience, which he has gained in a good school. His Company—the British Gas Light Company—have, as our readers are well aware, recently acquired a controlling interest in a number of undertakings, and to him has fallen the task of re-organizing some of the distribution departments involved. Something of what this has meant will be gathered from the fact that in the case of one town at any rate it was decided to scrap the whole of the existing distribution system and lay entirely new mains throughout the district. Having looked to the external work, the internal organization of subsidiary undertakings has to be taken in hand; and on this the author had much useful information to impart. After quoting his experiences in illustration of old methods and up-to-date practice, Mr. Bonsey had no hesitation in expressing the opinion that the fusion of these smaller units is the right course. The increases in consumption resulting from this policy which he was able to set out must leave one in little doubt as to the correctness of his view.

Assuming that the policy of amalgamation will continue, as we have not the slightest doubt will be the case, and probably at a more rapid rate than hitherto, there is one thing we should wish to be continually borne in mind—the human element, or the personal touch. This was referred to at the meeting of the Eastern Counties Association, and it is a matter of the first importance. With growth in the size of an undertaking, close "personal touch" must become more difficult to maintain; but it must be upheld as far as possible. This we know is the feeling of the administration of the British Gas Light Company, who have won general admiration by showing that their business, though carried on over so large a part of England, can be conducted on "happy family" lines.

Experience of Gas Dehydration.

AN interesting paper contributed to the Convention of the American Gas Association is that of Mr. Charles Cooper, M.Sc., Chief of the Technical Staff of Messrs. W. C. Holmes & Co., Ltd., the originators of gas drying, outlining the experience of gas dehydration in Great Britain during the three years in which their process has been operated. Though this is not, of course, the first occasion on which an English engineer has been invited to address the American Association at their annual meetings, it may, we suggest, be taken as a compliment and as an acknowledgment that progress in some directions has been more rapid in this country than in America. England has sometimes been censured for her reluctance to adopt new ideas and pioneer technical development as compared with other countries. In this instance, however, the process which was first described in the paper by Mr. C. Harris before the Southern Association of Gas Engineers and Managers in 1927 has been accorded—judging by the number of works now distributing dried gas—both fair trial and ready acceptance. We gather from the information contained in Mr. Cooper's paper, which is published *in extenso* in our issue to-day, that works of all capacities ranging from 250,000 c.ft. to 20 million c.ft. daily are now distributing dehydrated gas.

Commenting on the paper by Mr. Harris in the "JOURNAL" for Nov. 23, 1927, we said that it marked an important conversion from crude to scientific practice in dealing with moisture in gas, and that the solution to the problem appeared, as far as could be ascertained at that time, successful both technically and practically. The past two years have demonstrated that our idea had substance; the total daily gas made actually going out dehydrated is now over 50 million c.ft., and plants for

treating a further 40 millions are contracted for or under construction. However, we are not a statistical bureau; what interests us most about Mr. Cooper's paper—an interest which will doubtless be shared by our readers—is how the possible disadvantages of the process have proved to be theoretical bogeys of no great consequence, and how the suggested advantages have been amply gained. Regarding the former, there was the suspicion that dried gas would dry the leathers of meters and governors. Examination of meters and governor leathers in districts supplying dried gas has proved that any fears in this direction are groundless. Then there was the idea that much trouble would be caused by dust being carried forward from the mains into the service pipes; and here again the fear has not been justified, for it has been shown that at ordinary velocities existing in consumers' services the dust which can be transported is infinitesimal in size and in total quantity, and that oil spraying as generally practised will definitely retain rust deposits *in situ*. Another objection raised to dehydration was the loss of volume of the gas as measured (saturated) for calorific value determinations at the works and as metered (dried) at the consumers' premises. Actually the loss experienced has not been as great as the calculated loss, due in part to the fact that in ordinary practice every cubic foot of water pumped from the drips represents 1250 c.ft. of gas for which the seller is not paid. However, official provision will doubtless be made in the near future for allowing for the state of moisture of the gas at the point of consumption; and this will eradicate the objection.

In the "Journal" for July 17, Mr. S. E. Whitehead, of Portsmouth, painted a rosy picture of the advantages derived from dried gas, the pigments he used being actual facts relating to the Portsmouth distribution system. Mr. Cooper paints on a larger canvas, but the effect is equally bright. He states simply that an almost immediate reduction of stoppage complaints has resulted in every case where the distribution system has been dried out; and this statement applies to stoppages from all sources, including dust and corrosion products. With regard to meter replacements, these have been reduced by 30 p.ct. in the district of the Company who installed the first dehydration plant; and the author adduces evidence to demonstrate that the distribution of dried gas has not resulted in greater leakage in this country. In fairness Mr. Cooper mentions, albeit in perplexity, the paper by Mr. H. L. Masser, who, at last year's convention of the "A.G.A.," dealt with the distribution problems of changing from manufactured gas to natural gas service in Los Angeles. The leakage when manufactured gas was supplied was 16 p.ct.; the corresponding figure when natural gas was pumped through the mains was 26 p.ct. Mr. Masser arrived at the conclusion that many minute leaks, previously water sealed, became dry and open; and as a partial remedy he resorted to oil injection. Perhaps discussion on this point at the meeting of the American Gas Association to-day will elucidate this matter and also throw light on the experience related last year by Mr. Masser concerning the number of service complaints caused by dust on the change-over from manufactured gas to natural gas.

It will be remembered that last July Mr. Whitehead cited reasons for his preference for installing drying plant between the station meters and the holders. Mr. Cooper says that every dry holder should store dry gas, and we think that no one will disagree with this; but he mentions that cases have arisen where it has been found advisable to place the dehydration plant after the holders, and that these conditions can be met efficiently without undue loss of pressure of the gas, which is an all-important consideration. We have written at some length on this subject of gas drying because we think that its introduction into general gas supply implies true economy by conserving the vast amount of the industry's capital sunk in underground mains and services, and means better service to the consumer. Gas has the well-earned reputation to uphold that wholesale interruptions in its supply are unknown, in which respect it has a definite advantage over electricity; and if dehydration eliminates constituents which may possibly cause interruption in supply to the individual consumer, then another step forward will have been made.

An Assessment Principle.

The Appeal of the Bath Gas Company to Quarter Sessions from the assessment confirmed by the Bath Assessment Committee will be of considerable interest at a time when the majority of gas undertakings are dealing with the new assessments necessitated by the Rating and Valuation Act, 1925. At the hearing of the case before the Assessment Committee the valuer to the Rating Authority based the assessment on an entirely new principle. In estimating the amount to which the tenant was entitled as the remuneration on his capital, the valuer to the Rating Authority had based his calculations upon the theory that the net receipts of the undertaking represented a sum which was to be divided between the hypothetical landlord, the hypothetical tenant, and the rates. He thereupon allotted 55 p.ct. of this sum to the tenant, regarding the remaining 45 p.ct. as the share of the hypothetical landlord. The usual information which is required for estimating the tenant's capital in the ordinary manner was not demanded from the Gas Company, and was therefore not before the Assessment Committee during the hearing of the case.

Against a theory so revolutionary, the Gas Company appealed to Quarter Sessions, and for the purpose of obtaining a clear issue at the hearing accepted the figures of the Rating Authority in respect of gross receipts, tenant's working expenses, and maintenance. The Rating Authority, however, contended that by appealing against the decision of the Assessment Committee the Gas Undertaking had opened the whole case, and that they were entitled to put searching questions to the Company, not only with respect to the matter raised by the Company in their case, but also in regard to those items which had been admitted by the Company.

The hearing was lengthy, and occupied the whole of the time of the Court on Oct. 4 and 5; and judgment was given by the Recorder on Monday, Oct. 7. The Recorder gave a closely reasoned and comprehensive judgment, in which he criticized the basis upon which the remuneration due to the tenant had been fixed by the Assessment Committee. He stated that he was not convinced that in ordinary cases any necessity for a new method existed, and that, even if he had been convinced, he did not think that he would have departed from the regular practice and the regular custom, being satisfied that it was a proper result. He stated that if any change was to be made in a long-established method of valuation, it should not be adopted until the following conditions were found: (1) That there was a consensus of opinion by valuers generally that it is necessary, and not when there is no such consensus. (2) That it could be proved that the whole method had broken down. (3) That the new method had been confirmed by legislation.

The Recorder stated that he adopted the contention of the Gas Company as to the method upon which tenant's capital should be estimated, and rejected the contention of the Rating Authority. This being so, it made it necessary for him to examine the figures in detail. The usual expenses allowed under tenant's capital, such as the cost of meters and cookers, &c., were then considered, and the Recorder allowed 15 p.ct. on the sum of these items as the remuneration of the tenant.

The Recorder then went on to call attention to the attempts of the Rating Authority to raise matters before him which had not been considered when the case was before the Assessment Committee and against which no appeal had been made by the Gas Company. The Recorder stated that he desired to express a very strong opinion that it was most inconvenient for a case to be conducted in a wrong manner before the Assessment Committee upon a certain basis of figures, even when the question of principle upon those figures was ultimately raised, and then for that to be entirely thrown over when the case came to an appeal, so that, as happened in this case, it became necessary to examine a number of matters into which the Assessment Committee had never had the advantage of making a real investigation, and upon which the valuers for the Assessment Committee had not made the full and detailed inquiries which they conducted after the appeal had been launched.

Estimation of Tenant's Capital.

THE Recorder stated that the main point in the case was the principle upon which tenant's capital should be estimated, and that it was unfortunate, in view of the attitude taken up by the valuers for the Rating Authority, that this matter was never investigated, at all events in any detail, before the Assessment Committee—the result being that the officials of the Gas Company had been under an obligation to explain to him their case without having the advantage which they would otherwise have enjoyed of knowing beforehand the type of criticism which was likely to be directed against their contention at the hearing of the Appeal. He was satisfied that the Officials of the Company had done their best to furnish all information which might reasonably and properly be required in this matter, and he expressed no opinion regarding the suggestion made by the Rating Authority that the Gas Company had been disinclined to furnish information required by the Rating Authority. He found, however, that he could not accept all the figures put forward by the Company, and, as a result, was unable to decrease the actual amount at which the Company had been assessed by the Rating Committee.

The result was, therefore, that, though the Company succeeded in upholding the long-established principle upon which gas undertakings have for many years been assessed for rating purposes, their appeal was dismissed purely upon the question of figures. Owing, however, to what the Recorder described as the unbusinesslike procedure adopted by the Rating Authority in demanding an investigation before him of figures which had never been considered before the Assessment Committee, the Recorder stated that he would not award full costs against the Company, and made an order that the Company should pay half the cost of the Rating Authority, those costs to include only one Counsel's fee.

"B.C.G.A." Conference.

In this issue there will be found the full programme for the forthcoming Eastbourne Conference of the British Commercial Gas Association. It is an attractive one in every respect. The presence of Royalty will add lustre to the proceedings, in which work and recreation will be admirably proportioned. Mr. Frank H. Jones, M.Inst.C.E., has determined to make his Presidential year a memorable one; and there is no doubt whatever that he will succeed.

Institution Autumn Meeting and Charter Dinner.

Following upon the "B.C.G.A." Conference, there is to be, on Nov. 13 and 14, the Autumn Meeting of the Institution of Gas Engineers, under the Presidency of Mr. C. S. Shapley, of Leeds, with a dinner at the Criterion Restaurant on the first-named date to celebrate the granting of the Royal Charter. This meeting is an innovation, and the details of the programme set forth elsewhere in this issue indicate that ample scope will be provided for discussion. In the main, the business will consist of consideration of reports submitted at the Annual Meeting, which there was not then an opportunity of dealing with fully. In addition, however, to the valuable matter contained in these reports, there will be wide interest in an item tabled for the afternoon of the first day—*i.e.*, Wednesday, Nov. 13. We refer to a statement on the use of creosote in carburetted water gas plants.

Committee on Gas Poisoning.

It will be seen from later pages that the Committee appointed by the Board of Trade, with Sir Evelyn Cecil as Chairman, to inquire into the question of gas poisoning fatalities, have got fully to work. At the earliest possible stage, the Committee invited the Press, in the interests of the community generally, not to give undue prominence to any particular aspects of the inquiry which might tend to promote suicide by gas. The first witness (Dr. T. H. C. Stevenson, from the General Register Office) quoted a number of suicide statistics, from which it appeared that the commonest form of suicide in 1928 was coal gas poisoning with 1086 deaths; drowning coming next with 959. Mr. F. W. Goodenough, who followed, stated that the number of accidental deaths attributable to gas poisoning was such as to indicate the relative freedom of the population from fatalities due to this cause.

The "Gas Salesman" Supplement.

With this month we begin once more the winter season, during which the "Gas Salesman" Supplement appears with the "JOURNAL" twice, instead of once, monthly. On this occasion, however, October embraces five Wednesdays, and the "Gas Salesman" appears with this week's number, rather than with the second issue of the month. There are in it reports of several Circle meetings; and readers will be glad to see the portrait of Mr. H. Ernest Hunt, whose series of addresses on "The Higher Salesmanship" is creating widespread interest. It is our feeling that we have been privileged in securing the opportunity of offering to salesmen these articles from the pen of a deep thinker. They should prove helpful all round; for if the gas salesman is to win through, it will be by his own strength of purpose, and not through any weakness on the part of his competitors.

The Index.

The five-number month, and the inclusion of the "Gas Salesman" Supplement with this issue of the "JOURNAL," has made it necessary to vary the date for including the Index. Will readers please note that the Index to the last quarterly volume of the "JOURNAL" (July to September) will be included in next week's number?

Tar and the Small Gas-Works.

Indebtedness is acknowledged to the management of the Horsens (Denmark) Gas-Works, from whom, as a consequence of the article entitled "Tar and the Small Gas-Works," we have received a translation of a paper read by Mr. J. Qvist before the Association of Danish Gas-Works Directors. This paper discusses the preparation of ordinary road tar for surface treatment at any small gas-works; and the author says tar of good quality can be produced. The plant must, however, be cheap, and it must be worked to capacity. The paper illustrates a plant of this character, of the intermittent type. Plants as described by Mr. Qvist are, we are informed, in use with most satisfactory results in the gas-works at Flensborg, 62,000 inhabitants; Vejle, 25,000; Viborg, 15,000; Varde, 6000; Hillerd, 8000; Horsens, 28,000; and Odense, 61,000. A number of other Danish Gas-Works are intending to take up the manufacture of Road Board tar. At Horsens and Viborg, the gas-works not only deal with their own tar, but receive crude tar from England (and other Danish gas-works) for treatment.

FORTHCOMING ENGAGEMENTS.

Oct. 17.—SOCIETY OF BRITISH GAS INDUSTRIES.—Meeting of Council in the afternoon.
Oct. 19.—YORKSHIRE JUNIOR GAS ASSOCIATION.—Annual General Meeting. Address by Mr. C. S. Shapley.
Oct. 19.—WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION.—Opening Meeting.
Oct. 24-25.—INSTITUTE OF FUEL.—Annual conference at the Institution of Mechanical Engineers.
Oct. 25.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Opening meeting and re-union at the Westminster Technical Institute at 7.30 p.m.
Oct. 28-30.—BRITISH COMMERCIAL GAS ASSOCIATION.—Annual Conference at Eastbourne.
Nov. 2.—MIDLAND JUNIOR GAS ASSOCIATION.—Visit to Saltley Works, Birmingham.
Nov. 6.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Visit to the Works of the Stanton Ironworks Company, near Nottingham.
Nov. 7.—MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Autumn meeting.
Nov. 9.—SCOTTISH JUNIOR GAS ASSOCIATION (EASTERN DISTRICT).—Joint Meeting with Western District in Glasgow.
Nov. 13-14.—INSTITUTION OF GAS ENGINEERS.—General meeting in London.
Nov. 20.—SOCIETY OF BRITISH GAS INDUSTRIES.—Autumn General Meeting, Hotel Metropole.
Nov. 22.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—General meeting at the Hotel Cecil, Strand, W.C., 2.15 p.m.

PERSONAL.

We learn that Mr. Sidney F. Chamberlain, who has for over thirty years represented the firm of Messrs. Thomas Glover & Co., Ltd., in the Eastern Counties of England, is taking up his new position at the Head Office of the firm at 48, Grosvenor Gardens, London, S.W. 1, at the end of this month. In future the duty of representation in that area will be carried out by Mr. Charles Glover Clark, who has been with the firm since his apprenticeship with them. We wish both these gentlemen every success in their new spheres.

Mr. J. L. Watkins, who was articled as a pupil to Mr. W. Prince, late Engineer and Manager to the Tipton Gas Department, has now a position with the Compania Petrolera Lobitos, and is at present engaged in the extraction of gasoline from natural gas.

OBITUARY.

In our last issue we referred with regret to the death, at a London nursing home on Oct. 2, of Mr. H. Douglas Burn, the Managing Director of Metropolitan Gas Meters, Ltd., of Nottingham and London. Mr. Burn was well known among gas engineers throughout England, and had been a Director of the Company for 29 years. The funeral took place at Norwood Cemetery on Saturday, Oct. 6.

Institution of Civil Engineers.—The Council of the Institution of Civil Engineers have awarded the Indian Premium for Session 1928-29 to Mr. H. N. Colam, B.A., Assoc.M.Inst.C.E. (Simla), and a Webb Prize to Mr. C. Gribble, M.Inst.C.E. (London). They have also made the following awards for Session 1928-29 in respect of selected engineering papers, published without discussion: Telford Premiums to Messrs. H. Chatley, D.Sc., M.Inst.C.E. (Shanghai); E. B. S. Powell, Assoc.M.Inst.C.E. (London); R. D. Gwyther, M.C., M.Sc., M.Inst.C.E. (Jersey); R. D. Brown, M.Inst.C.E. (Manchester); E. Parry, B.Sc., M.Inst.C.E. (London); A. B. Miller, D.S.O., M.C., M.Sc. (Weybridge); G. B. R. Pimm, Assoc.M.Inst.C.E. (Bristol); W. H. Clark, M.Inst.C.E. (Johannesburg); and F. W. H. Downing, B.Sc., Assoc.M.Inst.C.E. (Bombay).

PRESENTATION TO MR. C. S. SHAPLEY.

Marking his Presidency of the Chartered Institution.

Mr. C. S. Shapley, Engineer and Manager of the Leeds Gas Department, was the guest last week at a social gathering in the Hotel Metropole, Leeds, in celebration of his appointment as President of the Institution of Gas Engineers.

Over a thousand persons subscribed to a presentation, which took the form of a large gramophone and wireless set combined, and a handsome presentation book, and all classes of employees in the Department were represented in the assembly. In addition, many members of the City Council attended, including Alderman G. Ratcliffe, and Councillors G. H. Greensmith, A. E. Ives, J. Clarke, R. Tortington, and J. Friend.

Councillor Clarke, who presided, said that Mr. Shapley, by his election to President of the Institution, had attained the peak position in his profession. He was pleased to announce that out of a total of ten members of the Gas Committee, eight were present to lend their support to the presentation. Further evidence of the regard in which Mr. Shapley was held by the Committee and his staff, he said, would be difficult to find.

Mr. J. Garside (Gas Inspection Department), in making the presentation, congratulated Mr. Shapley on behalf of all present on his appointment. The presentation was prompted by a sincere desire to register recognition from a staff who were proud to claim Mr. Shapley as their Chief.

Mr. C. H. Mitchell outlined the improvements which Mr. Shapley had initiated since coming to Leeds eleven years ago, both in the works and in the conditions of labour for the workers. His influence, he said, had been felt throughout the West Riding.

Mr. Shapley, who was accompanied by Mrs. Shapley, responded, and thanked the subscribers to the presentation, and expressed gratitude to the Gas Committee for their encouraging support and permission to accept the Presidency of the Institution. Gas, he added, was still a vital industry, but, compared with coal mining and other industries, suffered from lack of publicity in the Press. It behoved the managers throughout the country to obtain more support for the industry, for practically every citizen of Leeds and every ratepayer in the country used gas in their homes.

Musical entertainment was provided by a number of well-known local artists, many of whom are members of the Gas Department staff.

GAS STOCK AND SHARE MARKET.

[For Stock and Share List, see later page.]

Though a review of the past week does not reveal many bright features, the stock markets, notwithstanding the recent critical events, were distinctly brighter. It is true that the chief interest was in the investment sections; but in many cases Industrials and the more speculative shares closed with prices more favourable to holders. Gilt-edged stocks, however, benefited the most, and in the present state of the market there was difficulty in satisfying the demand. Even Home Rails came in for a good deal of attention, and Foreign Bonds were more sought after than for many weeks past.

In the Gas Market, other than recoveries of 10 points in Imperial Continental capital, 6½ points in South Shields consolidated, and 1s. 6d. in Primitiva ordinary shares, there is nothing of particular significance to record, and, excepting several *ex* div. variations, most of the changes in the quotations were again in a downward direction. From the small number of transactions it is clear that holders have confidence in their investments, but forced sales produced some exceptional bargains, among which were Commercial ordinary at 93 and Uxbridge 5 p.ct. at 95. The latter stock, with its 7 p.ct. dividend, is very attractive. There is a rumour that there is the possibility of a new issue shortly; and should this materialize, it is a foregone conclusion that a much better price will be obtained than the present quotation indicates.

The following transactions were recorded during the week:

Monday.—Alliance and Dublin 96, British 5 p.ct. deb. 96½, Commercial 93, Croydon sliding-scale 106, max. div. 82, Gas Light and Coke 17s. 10½d., 17s. 11½d., 18s., 18s. 1½d., 18s. 2½d., 3½ p.ct. max. 61, 61½, 4 p.ct. pref. 72½, 3 p.ct. deb. 56⅜, 57, 57½, 58, 5 p.ct. deb. 98½, Imperial Continental 395, 397½, 399¼, 400, 402, 403, Montevideo 106, Oriental 112, 112½, Primitiva 33s. 4½d., 33s. 6d., South African 82s. 6d., South Metropolitan 100, 100⅜ 100½, 3 p.ct. deb. 55, Southampton 5 p.ct. max. 78, Tottenham 3⅛ p.ct. 106½, Uxbridge 5 p.ct. 95. Supplementary prices, Eastbourne "B" 100.

Tuesday.—British 115½, 116, 5 p.ct. deb. 96½, Cape Town 9½, Commercial 93, Gas Light and Coke 17s. 9d., 17s. 10½d., 18s., 18s. 1½d., 18s. 3d., 3 p.ct. deb. 57, Hastings and St. Leonards 3½ p.ct. 78, Imperial Continental 397, 400, 401, 402, Maidstone 5 p.ct. 123, 3 p.ct. deb. 53, Primitiva 33s. 9d., 34s., 34s. 3d., 34s. 6d., South Metropolitan 100, 100½, South Suburban 5 p.ct. 103, Tottenham 3½ p.ct. 105, Tuscan 37s. 6d., Uxbridge 5 p.ct. 96. Supplementary prices, East Surrey 5½ p.ct. pref. "A" 90.

Wednesday.—Alliance and Dublin 96⅝, British 5 p.ct. deb. 96¼, Gas Light and Coke 17s. 10½d., 18s., 18s. 1½d., 3 p.ct. deb. 57, Imperial Continental 402, 403, Primitiva 34s. 3d., South Metropolitan 99½, 100, 100½, South Suburban 5 p.ct. 104. Supplementary prices, Liverpool 5 p.ct. 94¼.

Thursday.—Alliance and Dublin 97½, Bombay 17s. 6d., 18s., Cape Town 9½, Commercial 93, Croydon sliding-scale 105, 106, max. div. 82, European 14½, 14¾, Gas Light and Coke 17s. 9d., 17s. 10½d., 18s., 18s. 1½d., 18s. 3d., 4 p.ct. pref. 71½, 72½, 5 p.ct. deb. 98½, Imperial Continental 393, 398, 400, 3½ p.ct. deb. 72, Primitiva 34s. 9d., South Metropolitan 99¾, Tuscan 39s. Supplementary prices, Montevideo 6 p.ct. deb. 99½, 100, Watford "A" 101, "B" 91½.

Friday.—Alliance and Dublin 97, British 115½, 4 p.ct. deb. 72, Croydon 106, European 14¼, 14⅜, 14⅞, 15, Gas Light and Coke 18s., 18s. 1½d., 18s. 2¼d., 18s. 3d., 3 p.ct. deb. 57, Primitiva 35s. 3d., 4 p.ct. cons. deb. 81½, South Metropolitan 100½, South Suburban 5 p.ct. deb. 95. Supplementary prices, Ascot 10 p.ct. 11⅞, 12, Brighton and Hove 7 p.ct. deb. 101, Cape Town 5 p.ct. deb. 73, Liverpool 5 p.ct. deb. 98½, 99.

Money was abundant in Lombard Street, as is usual at the end of the week. Five p.ct. was charged for fresh advances; and though lenders adhered to 5½ p.ct. during the early hours for renewals, the rate ultimately fell to 4½ p.ct. The ease in money led to a further weakening in discount quotations in spite of the fact that Treasury Bills were allotted at £6 5s. 3·42d. p.ct.—a slight increase of 2¼d. p.ct. above the previous week's average rate.

There was little change in Foreign currency rates. Sterling on New York, after touching 4.86$\frac{7}{16}$, finished at 4.86$\frac{13}{32}$. The Paris rate was less favourable to sterling at 123.94; and other rates were: Belgas, 34.86⅜; pesetas, 32.75½; Italian lire, 92.05; Dutch florins, 12.09⅜; and German marks, 20.39⅜.

The Bank Rate is 6½ p.ct., to which it was raised from 5½ p.ct. on Sept. 26. The Banks' deposit rate is 4½ p.ct., and the deposit rates of the Discount Houses are 4½ and 4⅜ p.ct.

AUTUMN MEETING OF THE INSTITUTION.

Wednesday, Nov. 13, and Thursday, Nov. 14.

The Autumn Meeting for the discussion of Research Reports will be held on Wednesday and Thursday, Nov. 13 and 14, at the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, W.C. 2, under the Chairmanship of the President, Mr. C. S. SHAPLEY, Engineer and General Manager, City Gas Department, Leeds. As will be seen from the following agenda, a dinner to celebrate the granting of the Royal Charter will be held at the Criterion Restaurant on Wednesday evening, Nov. 13, at 7.15 for 7.30 p.m.

Wednesday, Nov. 13.

11.0 a.m. Charter By-Laws.
Supplementary Report to the 23rd Report of the Joint Research Committee of the Institution and Leeds University.
Discussion of the 22nd and 23rd Reports of the Joint Research Committee of the Institution and Leeds University—Studies in Carbonization—Parts IV. and V.
Discussion of the Gas Research Fellowship, 1929, Report.

2.30 p.m. Statement on Use of Creosote in C.W.G. Plants.
Discussion of the Report of the Refractory Materials Joint Committee, 1929.

7.15 p.m. for 7.30 p.m. Charter Dinner at the Criterion Restaurant, Piccadilly Circus (Jermyn Street entrance).

Thursday, Nov. 14.

11.0 a.m. Discussion of the 1st Report of the Ammonia Sub-Committee

2.30 p.m. Discussion of the 3rd Report of the Effluents Sub-Committee

NATIONAL GAS COUNCIL.

A Meeting of the Central Executive Board of the National Gas Council took place on Oct. 8 at 28, Grosvenor Gardens, S.W. 1—Sir DAVID MILNE-WATSON in the Chair.

AREA GAS SUPPLY COMMITTEE.

It was reported that Mr. S. S. Ogilvie (Joint Manager) had given evidence on the previous day, on behalf of the gas industry, before the Area Gas Supply Committee, and had been closely cross-examined by the Committee for several hours. It was also reported that, with reference to the leading article appearing in "The Times" on Sept. 11, under the heading of "Surplus Gas and Electricity," the President had replied in a letter which was published in "The Times" on Sept. 13, pointing out that such statements as were contained in the article in question were ill-advised, in view of the fact that the subject was still *sub judice*.

CARBON MONOXIDE INQUIRY.

The proof of evidence to be submitted by Mr. F. W. Goodenough, C.B.E., on behalf of the gas industry before the Departmental Committee on Sept. 10, was approved.

UNDERGROUND GAS ESCAPES.

An Interim Report of the Committee appointed by the Central Executive Board to investigate the question of underground gas escapes and the desirability of inspection or ventilation was approved, and it was agreed that a copy should be circulated to members of the Council.

RATING APPEALS: BATH GAS COMPANY.

It was reported that the Council had succeeded in their object in supporting the appeal of this Company from the Assessment confirmed by their local Assessment Committee—in that the Recorder rejected the method of assessment adopted by the Assessment Committee, stating that he considered that the orthodox method of taking 15 p.ct. upon the tenant's capital should be adhered to until it had been expressly discarded by Act of Parliament.

In the case of two other Gas Companies where the Assessment Committees had departed from the orthodox method of valuation and had endeavoured to assess the Company upon the structural value, it was reported that, owing to the action of the Council, negotiations were now pending with a view to remedying the position. It was considered improbable that either case would be taken to Quarter Sessions.

WORLD POWER CONFERENCE.

It was reported that the Statutes of the World Power Conference had been amended so as to extend the scope of the Conference to include fuel as well as power, and to provide for the participation of fuel experts in addition to power engineers.

BRITISH INDUSTRIES FAIR.

It was intimated that arrangements were being made to hold a Joint Gas Conference at the British Industries Fair to take place at Castle Bromwich, Birmingham, from Feb. 18 to 20 next, and that full particulars of the programme would be issued to members of the Council through the medium of the Monthly Reports.

BRITISH COMMERCIAL GAS ASSOCIATION.

Annual Conference at Eastbourne.

The following programme has been arranged for the Eighteenth Annual General Meeting and Conference of the British Commercial Gas Association to be held at Eastbourne on Monday, Tuesday, and Wednesday, Oct. 28, 29, and 30, 1929, under the Presidency of Mr. FRANK HARDING JONES, M.Inst.C.E., Chairman of the Wandsworth, Wimbledon, and Epsom District Gas Company, and of the Eastbourne Gas Company.

Monday, Oct. 28.

Evening.

Reception and Lecture in the Floral Hall, Devonshire Park.

8.0 p.m. Reception by His Worship the Mayor of Eastbourne (Councillor Lieut.-Col. Roland Gwynne, D.S.O., D.L., J.P.).

9.0 p.m. Lecture by Dr. C. W. Saleeby, F.R.S. (Edin.), on "Sunlight and Health."
Light refreshments. Music. Evening dress. Decorations will be worn. Carriages 11.0 p.m.

Tuesday, Oct. 29.

Morning.

Business Conference in the Pavilion, Devonshire Park.

9.30 a.m. Assembly of Members.
Welcome by His Worship the Mayor of Eastbourne (Councillor Lieut.-Col. Roland Gwynne, D.S.O., D.L., J.P.).
Presidential Address by Mr. Frank Harding Jones, M.Inst.C.E.
Address by Lord Eustace Percy, M.P. (Past-President of the Board of Education), on "Education in Industry and Commerce."
Address by Sir Lawrence Weaver, K.B.E., on "Knowledge of Craft and Technique as an Aid to Salesmanship."

12.30 p.m. Adjournment.
(Reassembly of the Conference at 2.15 p.m. in the Floral Hall, Devonshire Park.)

Afternoon.

Visit of Their Royal Highnesses the Duke and Duchess of York.

Their Royal Highnesses have graciously consented to be present at a Conversazione in the Floral Hall, Devonshire Park.

Visitors to the Conversazione should arrive not later than 2.45 p.m.

2.15 p.m.

Music, followed by short informal Lectures on "The Manufacture, Purification, Testing, and Applications of Gas," illustrated by pictures, slides, and apparatus.

The series of Lectures will be opened by an Address by the Executive Chairman of the Association, Mr. F. W. Goodenough, C.B.E.

4.10 p.m.

Tea will be served immediately after the departure of Their Royal Highnesses.

Evening.

7.15 for 7.30 p.m.

Dinner by invitation of the Chairman and Directors of the Wandsworth, Wimbledon, and Epsom District, and the Eastbourne Gas Companies, to the President-Elect, Vice-Presidents, and Members of the British Commercial Gas Association and visitors.

7.15 p.m.

Reception of guests by the President.
Evening dress. Decorations will be worn.

Wednesday, Oct. 30.

Morning.

Business Conference in the Pavilion, Devonshire Park.

9.30 a.m. Assembly of Members.

9.40 a.m. Opening remarks by the President of the Conference.
Presentation of annual report and statement of accounts by the Executive Chairman, Mr. F. W. Goodenough, C.B.E.
Address by Mr. A. Hayday, M.P. (Vice-Chairman, National Union of General and Municipal Workers), on "The Importance of the Gas Industry to Labour in General and to the Worker's Home in Particular."
Paper by Mr. C. M. Croft (Chief Engineer and General Manager of the Wandsworth, Wimbledon, and Epsom District Gas Company) on "Service to the Consumer."
Paper by Mr. Philip G. G. Moon (Engineer and General Manager, Bournemouth Gas and Water Company) on "The Uses of Gas in Hotels, Restaurants, Boarding Houses, and Public Institutions."
Discussion on papers.

1.15 p.m. Adjournment.

1.30 p.m. Luncheon in the Grand Hotel by invitation of the President-Elect, the Vice-Presidents, and Members of the Association, to the retiring President and the Directors of the Wandsworth, Wimbledon, and Epsom District and the Eastbourne Gas Companies.

Close of Conference.

Inventor of Portland Cement.—At the meeting of the Manchester District Institution of Gas Engineers and Managers, the President, Mr. W. B. McLusky, referred to the inventor of Portland cement, Mr. Joseph Aspden, who was a Leeds bricklayer. The name appeared in error as Astin in our report of the meeting, see p. 106.

MANUFACTURE OF ROAD TAR AT SMALL GAS-WORKS IN DENMARK.

By Gas-Works Director J. Qvist, Horsens.

[Before the Association of Danish Gas-Works Directors.]

The transition from horse vehicles to motor-cars has revolutionized road-making technique. Road engineers are now employing tar for newly-laid roads to such an extent as to account for all the tar produced in Denmark. The high tar prices indicate this development.

The road tar is sprayed by machinery on the dry and brushed surface of the newly-laid road, the quantity used being about 1 kg. per sq. m. After the spraying machine follow a gang of workers who spread a thin layer of gravel over the tar. A newly-laid road is generally treated twice the first year, with a short interval; later, it is only tarred once a year, every spring. For the first treatment, road tar is always used; but for the later treatments asphalt may also be employed. The price of these two competing products therefore decides which will be preferred. Asphalt is somewhat tougher than road tar, and may be dissolved by oil dropping from motor-cars; the spraying of it is more difficult and demands more expensive machines.

At present, road engineers demand a tar with a density lying between 1·19 and 1·225 at 15° C.; the water content must not exceed 0·8 p.ct., and the light oil content 1 p.ct. It is not difficult to comply with these demands. There must be 12 to 24 p.ct. of middle oils and 4 to 12 p.ct. of heavy oils. Horizontal retort tar complies with these conditions. The phenol must not exceed 5 p.ct. (which is the case with vertical tar), and the maximum naphthalene content is 8 p.ct., which is exceeded by the tar—especially horizontal tar—from some gas-works. The maximum allowable content of free carbon is 22 p.ct.

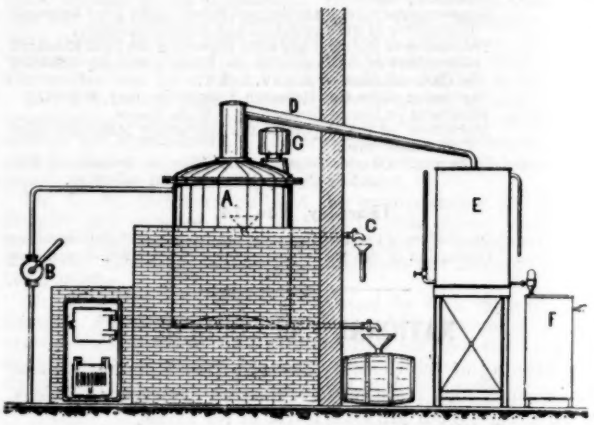
The Danish standards demand a minimum of 12 p.ct. of free carbon, which should exclude the use of vertical tar. The English, however, give no minimum. Theoretically, naphthalene in road tar is harmful, but this has not been confirmed by practice. It was said by certain producers that vertical tar was no good because of the low percentage of free carbon. The users held a different opinion, and proved victorious, being the stronger. Great emphasis has also been laid on the manufacturing methods—and rightly so, when speaking of road tar for special purposes, the manufacture of which demands mass production and expensive machinery.

I intend here, however, to confine my remarks to the ordinary road tar for surface treatment, which is a product greatly in demand, and which may be produced in good quality at any small gas-works, in spite of the great secrecy with which road tar production is often surrounded. It will be greeted with joy by road engineers, and be of national economic importance. Gas-works procedure is well suited for its manufacture. Whereas a special factory must procure the raw tar from without, pay freight and transport—(say) for instance, 10 kroner per ton—and put up expensive tanks, the gas-works have the tar at hand, and also the necessary tanks. Whereas the special factories must convey the finished road tar to the customers, the gas-works have the customers at hand—namely, the local road authorities—who can fetch the tar in their own motor lorries or barrels. In this way the buyer may easily save 10 kroner per ton, and even more in unfavourable localities. Whereas the special factories must buy, and pay freightage on fuel, the gas-works have a fuel in coke breeze which is at least five or ten shillings cheaper per ton; and gas-works can save at least five shillings in wages per ton, through suitable management of the distillation, as compared with the special factories. Gas-works will always be able to make 30 kroner more on the manufacture than can special factories.

The question whether road tar may be produced advantageously depends solely on how far the manufacture can stand interest and amortization of establishment expenses. The plant, therefore, must be cheap, and it must be worked to capacity. The fuel plays an unimportant part, as the cheap waste-product is at hand; but additional expenses in wages must be avoided if possible. The value of the Horsens distillation plant, which will produce 3000 tons a season as maximum, may be put at 80,000 kroner. (It has, however, only cost a fraction of this, owing to specially advantageous local conditions.) If the interest is put at 5 p.ct. and the amortization at 10 p.ct., a charge of kroner 6·33 per ton is attained with full exploitation of the plant. If the production is only one-third, the expense will be 20 kroner, which is too great.

Continuous distillation demands constant attention, and is more expensive for small plants when all conditions are taken into account; and as the fuel problem is of little importance, I cannot recommend this system for small gas-works. An intermittent plant can take care of itself until the tar is heated to the critical point; and the attention it demands after this can be reduced considerably by routine. At the end of the process, the tar may remain (for cooling, if wooden barrels are employed) in the distillation boiler itself, and from there can be tapped into the barrels of the buyer. The boiler thus serves also as a tank.

Before distillation the raw tar must be drained. Tar containing water should not be distilled. The draining takes place by heating the tar to 60° C. or more. After the draining, the tar is quickly heated in the distillation boiler to 95° C.; and after this slowly until the water is entirely drained off, which is shown by the temperature suddenly rising to over 100° C. Then you may stoke up without fear of boiling over. The light oils are driven off at 135° to 170° C., and the road tar is ready for use.



The diagram shows a plant of this kind. A is the retort. The furnace, intended for coke breeze firing, is arranged outside. It is not as economical as a built-in furnace, but it eliminates boiling-over of the tar. With the pump B, A is filled to the upper water-line with raw tar, which is heated at over 60° C., and left to cool for half a day or more. After this, the water-containing tar is conveyed away through the valve C, and the distillation can now commence. Through the cooling tube D the steam goes to the condenser E. Water and light oils are separated in F. The light oils are pumped into the raw tar after the draining, to make the distilling easier. G is the safety valve. Arrangements can be made for draining one day. In the evening you stoke up so that the temperature is 90° in the morning, whereafter the distilling can be begun and finished in the course of a working day. Next morning the tapping may take place. The boiler should hold so much that the road authorities may fetch one cartload of tar at a time.

Supposing the price for the plant to be 6000 kroner, 900 kroner a year is demanded for interest and amortization. If we count on 30 kroner per ton, 30 tons of road tar will be the smallest annual production which will render the plant a paying proposition. If we calculate that three days is the maximum between each operation, the gas-works will be able to deliver 30 tons of road tar in the course of one-and-a-half months. The season lasts from May till August; so in this respect also the plant is satisfactory.

This is what the first road tar distillation in Horsens was like; and with it we produced a good tar plant which complied with the standards—and that from the Horsens horizontal tar, which was not very famous! When our town engineer had verified the good quality of the tar, and had tried it on the Horsens roads, business with urban councils made headway. We then built a bigger plant, working on another system, which we have had to enlarge in the course of time.

For gas-works with a somewhat greater production it is not a good plan to drain in the distillation boiler itself, and we recommend a special tank of at least 15 tons, round or square, new or old. From this the water-free tar is pumped into the distillation boiler—if the tank is placed high, the pumping is avoided. The heating may be done by coke breeze or by steam. By means of this insignificant purchase, the capacity of the plant is enlarged by 50 p.ct., it being now possible to have one operation every second day, instead of every third. For gas-works with still bigger tar production, plants of this kind will not suffice. As soon as the road authorities count on obtaining all their consumption, or the greater part of it, from one gas-works, this works must guarantee a prompt delivery in the season. If you fail on this point, you are done for as a contractor.

It is therefore necessary to have substantial machinery on which you can rely, and apparatus with a large capacity; and you must count on additional expense for wages and control when analysis is to be guaranteed. In this case, indirect heating and distilling under vacuum are desirable for safety. In still larger works, the risk of having to deliver a thousand tons

in three or four months must be considered. In order not to stake everything on one horse, it is best to work with two sets of apparatus. At such large works it is also necessary to be able to produce different qualities, to cope with competition. In Horsens, a combination of apparatus for continuous and intermittent work, and for direct and indirect heating, has proved good practice. One plant distils oils and pitch, and the desired qualities are arrived at by mixing—a matter which, however, is of no importance to smaller plants.

I have been asked to give figures for a plant of 100 tons per annum. I have used the prices for road tar and raw tar as they have been this season. The costs of construction are put at 12,000 kroner.

Income.			
100 tons road tar at 145 kroner at works			14,500·00
Expenses.			
Wages (not counting selling expenses, which are the same as for raw tar)		500·00	
Fuel, water for the condenser.		200·00	
Tar, 100 tons at 90 kroner, water-free at works		9000·00	
Amortization, 10 p.ct.			
Interest, 5 ,,			
15 ,, of 12,000·00		1800·00	
			11,500·00
Profit, kroner			3,000·00

NEW COKE OVEN PLANT OPENED AT CHAPELTOWN.

Surplus Gas for Sheffield Company.

A large and modern coke oven was opened at Chapeltown, Sheffield, on Oct. 14. The plant, which is owned by the Thorncliffe Coal Distillation, Ltd., will take 1200 tons of coal a day, which will produce 8 million c.ft. of gas, 840 tons of coke, 12,000 gallons of tar, 17 tons of ammonia and sulphate, and 3600 gallons of benzole. Half of the gas produced will be conveyed by a 6-mile main to the Sheffield Gas Company.

Sir Samuel Roberts, M.P., speaking at a luncheon, said that surplus gas could also be used for generating electricity. There was a great future for colliery companies which were able to generate electricity on a large scale.

Mr. Ralph Halkett, General Manager of the Sheffield Gas Company, said that of the modern coke oven installations he had inspected in France, Belgium, Germany, and Holland, he had not seen one to equal the new plant at Chapeltown.

Sir Arthur Duckham congratulated the Directors of the Sheffield Gas Company on their foresight and courage in taking supplies of coke oven gas. There would undoubtedly be a continually increasing amount of coke oven gas taken by gas undertakings, and the time must come when arrangements would have to be made for the supply of gas to large industrial concerns at a really economic price for everybody concerned.

EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.

Autumn Meeting in London.

The Autumn Meeting of the Association was held on Wednesday of last week at the Holborn Restaurant, London, W.C.—Mr. H. C. Smith, M.Inst.C.E., of Tottenham (the President), in the chair. A cordial welcome was extended by the President to Mr. C. S. Shapley, the President of the Institution of Gas Engineers, Mr. W. E. Dean, the President of the Southern Association, and Mr. C. M. D. Belton, the President of the Midland Association. The minutes of the last meeting were taken as read and confirmed.

The members rose silently as a mark of respect, when the President referred to the death, since the last meeting, of one of the members—Mr. J. Hawksley, of Lowestoft.

Additions to the Roll.

The following additions were made to the membership roll of the Association:

Members.

Mr. Cecil Rhodes Armitage, Norwich.
Mr. George Smithard, King's Lynn.

Associate.

Mr. W. T. Hallam, Bedford.

Presentation of Certificate.

The President next presented to Mr. C. B. Staniforth, of Gorleston, the certificate gained by him in the recent higher grade examination in Gas Engineering.

Transfer of Small Undertakings.

Mr. E. W. Bonsey, of London, then read "Some Notes, from a Distribution Standpoint, on the Transfer of Small Undertakings." This, with a report of the discussion, will be found on later pages of this issue.

On the proposition of Mr. F. Prentice (Ipswich), seconded by Mr. W. W. Townsend (Colchester), the author was heartily thanked for his paper.

The Institution President.

Mr. Shapley, upon being invited to say a few words, remarked that he had been at one time a member of the Association; and he was at present a member of the Manchester, North of England, and Southern Associations. He thought the Eastern Counties Association were very fortunate in having as their President Mr. Smith. For a number of years he had known Mr. Smith as a member of the Council of the Institution of Gas Engineers; and he had been a most active member of that Council. Whenever there was a particularly difficult piece of work to do, it was thrust upon Mr. Smith as being the best man for the job. It was a pleasure not to have to ask the Eastern Counties Association to make a change in their name, as he had done in other parts of the country in cases in which the word "Institution" was incorporated in the title. He did not know whether he had yet quite persuaded the Manchester District Institution in the matter; but he hoped to succeed. The Wales and Monmouthshire Institution had practically agreed to fall into line.

Representative on Institution Council.

On the proposition of Mr. A. Gregory (Harwich), seconded by Mr. J. W. Auchterlonie (Cambridge), Mr. H. C. Smith was elected to be the representative of the Association on the Council of the Institution of Gas Engineers.

New Office-Bearers.

Thereafter the following office-bearers were elected for 1930:

President.—Mr. A. Gregory, Harwich.

Vice-President.—Mr. J. Green, Wisbech.

New Members of Committee.—Messrs. P. D. Walmsley, Great Yarmouth; W. Grogono, Croydon; and W. C. Chapman, Boston.

Auditors.—Messrs. G. A. Mallett, Ipswich, and W. S. Venner, Brentwood.

Secretary and Treasurer.—Mr. E. F. Keable, Southtown, Great Yarmouth.

The President expressed the indebtedness of the members to the Committee, the Auditors, and especially the Secretary.

Education Committee Representative.

The President, in putting forward the proposition that Mr. W. W. Townsend, of Colchester, should be appointed their representative on the Eastern District Education Committee, said they had hitherto been faithfully served by Mr. Prentice; but he found himself unable longer to give proper attention to this work, which was very important. Now that the rules governing the scheme had been modified, he felt that the work would go on smoothly. Mr. Prentice had borne the heat and burden of the day; and they were greatly indebted to him.

Mr. Townsend's appointment was unanimously agreed to.

Place of Next Meeting.

Mr. Gregory said it was usual to hold the spring meeting in the President's town; and he was authorized to extend the cordial invitation of his Chairman and Directors to the members to visit Harwich next spring. They would receive a hearty welcome.

The President gratefully accepted the invitation on behalf of the members.

"Chemistry and Physics of the Combustion of Gaseous Fuels."—At a recent meeting of the Division of Gas and Fuel Chemistry of the American Chemical Society, G. E. Seil, H. A. Heiligman, and C. N. Witherow presented a paper bearing this title. The reasons for desiring to control the chemical constituents of the furnace atmosphere are discussed. In this connection the chemical and physical effects of excess CO, excess O_2, neutral atmosphere, and varying atmosphere are enumerated. The atmosphere in gas-fired tunnel and periodic kilns is traced throughout the burn, and compared with coal-fired kilns. Control of kiln atmosphere when using solid, liquid, and gaseous fuels is discussed. Various methods of burning gas industrially are described, with a full discussion of an annular orifice type of burner. This burner provides its own venturi for inducing air, and can use air which is too hot to be compressed. It can be employed in conjunction with a rigid venturi block. Curves and experimental data on producer gas, city gas, and oil burning are given.

EXPERIENCE OF GAS DEHYDRATION IN GREAT BRITAIN.

By Charles Cooper, M.Sc., of Messrs. W. C. Holmes & Co., Ltd., Huddersfield.

[A Paper read before the Annual Convention of the American Gas Association, Atlantic City, N.J., U.S.A.]

It was recently remarked by Mr. Ramsburg, at a Production Conference of your Association, that in Great Britain we were three years ahead of America in this matter of dehydrating gas before distribution. This is in strict fact quite a considerable exaggeration, as the subject was, as you know, considered at your Convention in 1926.

There have been now in England one plant in continuous operation for three years, six for over two years, and nine others for periods of over a year. The total daily gas make actually going out dehydrated is now over 50 million c.ft. Experience of the plant creates in each case a convinced and enthusiastic advocate of the practice. In this paper it is intended to show as fully as possible the experience which has been gained on all these plants where it is sufficiently extensive to be safely quoted.

In addition to the plants mentioned above as now operating, there is a further quantity of 40 million c.ft. under construction and contracted for. Of this, 20 million is foreign and colonial business. The larger works on the Continent of Europe are exhibiting a lively interest in the matter.

It will be of interest to relate the history of the process since it was developed on a commercial scale. It is significant of the changed methods of plant contracting work that the process should have originated not in a gas plant, but within the staff of a constructional firm. The position was somewhat unusual, and the policy that was followed in handling the subsequent business was from time to time a matter of much work and thought.

As reports came in from plants working, the new or essential matter was communicated by the builders to other users for their investigation, and various discussions were held on these lines. Similarly, points raised by prospective users which could not be dealt with on the basis of existing knowledge were made the subject of questionnaires, and the opinions and experiences compared and circulated.

In the meantime, a certain amount of publication was taking place, and dehydration data were coming in from various outside sources. When, therefore, the first comprehensive paper on an actual working plant was read,[1] it was recognizably more than a report on experiments; and a sound discussion was possible.

Many of the points which were brought forward, by actual and prospective users of the plant, were, of course, directly investigated by our staff, either alone or in collaboration with the interested parties. Some of these inquiries will be described later in this paper. They have covered a wide field, and it is now claimed that there is no objection inherent in the principle or process of gas dehydration that has not been met so far; and that the proved benefits greatly outweigh any difficulty that so far as can be seen may appear in the future.

Corrosion.

The laboratory work was in the early days largely concerned with the prospects of inhibiting corrosion of distributing pipes. This was, in the current view, the ultimate object of the dehydration process. The reduction of the number of service complaints hardly received notice, largely because the investigators were unlearned in the distribution side of gas business, and also partly because it was assumed without discussion that service complaints were part of the nature of things. As a result, the earliest difficulty that came to mind was that it might be very hard work to persuade the gas engineer to provide relief for a distant posterity. One objector went further than this and predicted that the plant would for years add to the trouble of dealing with dust, and that this penalty would have to be paid for the visionary benefit that a future manager might obtain.

As to the more general of the above objections, it has already been entirely contradicted by the fact that an almost immediate reduction of stoppage complaints has resulted in every case where the distribution system has been dried out. This statement applies, it must be noted, to stoppage from all sources, including dust and corrosion products.

As the writer mentioned in discussion on his paper on "Purification of Coal Gas" at the World Power Conference in England last year, the average saving in this matter alone was equal to not less than 20 p.ct. on the total plant cost, with operating charges allowed. (More recent data have actually shown an improvement on those available last year.)

The matter of dust, arising from the dissipation of corrosion deposits, merits, however, more than a general note. It is a common experience in districts employing high-pressure lines, as dry conditions result at times by reason of the expansion of previously compressed gas. Moreover, higher velocities are in use on such districts.

It is unfortunately the case that the great majority of distribution systems have been subject to corrosion in the past; but now that dehydration is possible, the useful life of these already affected pipes may be prolonged. It is, in fact, a point that has been carefully watched by our engineers who have adopted dehydration.

The engineer and manager of a large gas company in England invited us to investigate this subject with his own staff some months after dehydration had become effective in his distribution system. A number of different lines of work were followed up. The dust which was found in various parts of the pipe lines was, of course, practically all iron rust, and some quite bulky deposits must have existed. Yet the final conclusion to the investigation is according to the following summary:

1. At ordinary velocities existing in consumers' services the dust which can be transported is infinitesimal in particle size, and in total quantity.
2. No meter valves or governor valve seats have been found scored, as might be expected, if scale had been set on the move.
3. Oil spraying, as generally practised, will definitely retain rust deposits *in situ*. (From another source the information has been received that a spray of 2 to 3 gallons of heavy kerosene per million c.ft. has shown signs of its presence at 4 miles from the works, on a low-pressure line.)
4. Stoppage complaints from all causes have shown an 80 p.ct. reduction. While agreeing that it is not always possible to determine the exact nature of a stoppage, it is clear that there has been no great rush of dust into the smaller pipes. This is more evident because complete naphthalene removal had been practised for some years previously, and the district was probably cleaned up of these deposits.

These conclusions were quoted recently in a technical discussion by a member of the staff of the gas company concerned.[2]

There is in fig. 3b an analysis of stoppage complaints for some years back, taken from an entirely different system. This consists almost entirely of a compact nucleus of consumers, drawing from mains of long service on manufactured gas, and at present distributing dried gas at 450 B.Th.U. value. The partition of complaints into the three groups cannot perhaps be claimed to have a high degree of exactitude, but the persistence of rust should be noted, and its ultimate tapering-off almost to extinction.

In general, then, the fear of incurring trouble with dust has not been justified in any of the operating plants, though many of them have very old pipes in the ground. At the same time oil sprays previously in use for dealing with naphthalene have in some cases been kept in use, and on at least two widespread systems a portable spraying machine has been used at selected points on the district, at intervals. The practice of spraying is also believed to be beneficial to meter diaphragms, and this is a matter which has received more attention since many of our gas-works began to send out gas of lower calorific value than was formerly supplied.

Speaking generally, it is likely that the rate of occurrence of stoppages by dust will, therefore, be reduced by drying the gas, though not with the same promptness as the stoppages by water alone. Such a lag in the effect on complaints is familiar to those works which have installed plants for the removal of naphthalene from the gas. New distribution lines will, however, have immunity from corrosion, and therefore service stoppages by rust will not arise where the services are fed from these new pipes.

Meters and Governors.

It will be clear that the relief which can be given in respect of damage to dry meters can only show itself after a period of some years. If the average life of a dry meter has hitherto been (say) ten years, then for the present practically all meters removed from use have had a long spell under the previously existing conditions. The works which has now had three full years on dry conditions is so far the only one which can definitely certify a reduction of meter repair costs

[1] C. Harris, Southern Association of Gas Engineers and Managers, 1927.

[2] "Gas Journal," July 17, 1929.

which is so large that it can be claimed as being no accidental variation, but is a definite downward step. A tendency is certainly evident at other places, but, being of less degree and of shorter duration, no figures have yet been published.

The author has personally been present at the cutting-open of dry meters which have been selected and brought in for examination. In a recent case, two meters were selected, one of which had passed 50,000 c.ft. since dehydration was commenced, having been newly installed at about the time the district dried out. The other had passed an equal volume of gas, but half of this had been undried. The former meter had been in use about 18 months, and the latter 30 months.

Both meters were in excellent mechanical condition, free from any water, rust, or dust deposits. An ounce or two of oil lay in the bottom at such a depth that the leather touched at each contraction. The meter which had passed some wet gas could clearly be distinguished from the other, however, by the fact that the original bright tinning was grey filmed under the oil which covered it, and it had a general look of having been used. The meter which had only passed dry gas was, however, indistinguishable in internal appearance from a new meter.

An isolated observation like this has little value, but such comparisons have frequently been made at other works, resulting always in favour of the meter used on dried gas. Some original photographs of meters of equal life are available for inspection here, showing a more pronounced difference than that above described. One of these has had two years of average usage on a dry gas area, and the other is from an undried system passing gas of the same calorific value and working under corresponding conditions generally Naturally, they could not come from exactly the same stream, but they represent another isolated observation which gives support to the belief that meters are benefiting from dehydration.

To obtain evidence that conditions could be improved in this respect, we wrote to meter manufacturers who were handling the maintenance of meters for the company who installed the first dehydrating plant for an opinion on the meters passing into their hands. The result was a letter stating positively that the condition was progressively improved since dehydrating. At that time the rate of replacement of dry meters on this district was down by 30 p.ct. since starting the dehydrating plant.

With regard to leathers, it does not appear likely on the face of it, nor is there any evidence from our observations, that dry gas can affect a meter or diaphragm leather adversely. On the contrary, many meters have been examined where the leather was certainly well supplied with water, and where the damage was probably actually due to the water and impurities which it had collected. A leather dried up and deprived of its oil dressing might certainly suffer badly, but so far our observation has been that the dressing is well preserved in the leather; and perhaps better preserved by reason of the absence of liquid water.

This matter is mentioned because fears have been actually expressed as to the danger of drying the leathers. If, as is now

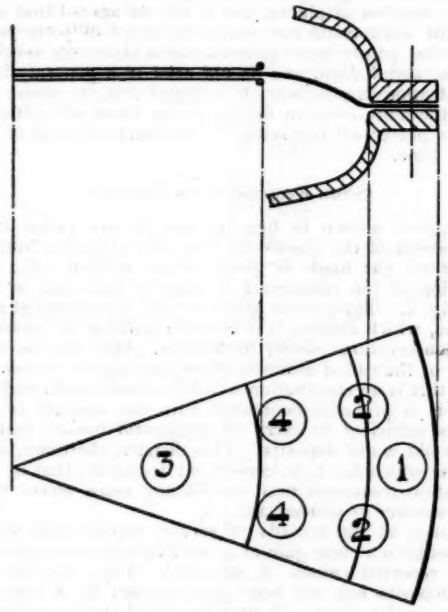


Fig. 1.

suspected, the dryness to be feared is lack of oily matter; this will be favourably affected by dehydration. In any case the author (considering the meters he has actually examined) can definitely say that the leathers were in first-class condition.

While discussing this subject, there may be quoted an examination of a governor leather which was reported to have failed on a district recently dried out. The failure, it should be stated, was a split at the point of maximum flexure; and the only point was that here was an opportunity of examining the leather to see if anything could be found relevant to its condition after drying.

The leather itself appeared to be in good general condition, though it had seen considerable service. Circular sections were taken from various parts; some from the section which had been between flanges, some from the annulus where the movement would take place, and so on. The sector shown in fig. 1 gives the locations of the circular sections indicated in the accompanying chart, fig. 2. The curves show leakage measured through equal areas of the various portions of leather due to air pressures as given.

The conclusion that can be drawn from the tests is that the exposure to dried gas has not set up any deleterious effect on the leather as such, and that the failure was due to ordinary causes; that is, the fatigue of the material at the point of flexure, perhaps at a point where the edge of the metal was slightly too sharp. This example is cited to show how the users of dehydration plants have assisted us by reporting directly on any observations which might possibly give information on what we may call the delayed effects of dehydration —that is, the effects which will not fully be demonstrated for some time and are chiefly of a negative character.

LEAKAGE.

It was, it must be confessed, with some surprise that the writer read[3] that districts which had turned over to natural

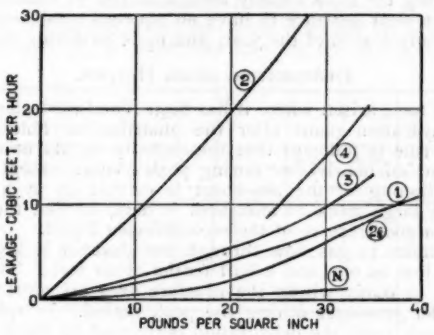


Fig. 2.

gas, after having sold manufactured gas for years, had reported an increase in gas unaccounted-for, which was attributed to leakage. The figures appeared well-established, and yet the result was, and remains, contrary to the experience of the various cases from which the present results are quoted.

For example, of four dry districts, the following has been the actual experience of unaccounted-for gas:

a. First year, rise of 1 p.ct.; second year, rise of 1 p.ct.; third year, no change. This district is carrying heavier pressures year by year, and the officials in charge find the price quite normal.

b. Practically no change. In any case, a rise or fall of less than (say) 2 p.ct. would not be considered significant.

c. Two successive falls of over 1 p.ct.

d. A rise followed by a fall, neither exceeding 1 p.ct.

The remainder of the people consulted have no change to report, and point out, as in the case of (*b*) above, that a change of 1 or 2 p.ct. is negligible and could be accounted for in many ways. There is definitely no report which gives a fluctuation of the order of 10 p.ct., which is found in the case mentioned above, and the difference is clearly worth some inquiry and discussion.

It will probably be of interest at this point to mention that, early in the history of dehydration, leaks in underground pipes were located in some cases by the detection of infiltration of surrounding water, where the pressure of the latter was sufficiently high. More recently[3] cases have been mentioned where outward leakage has been located, after detection by smell, by noting the powdery condition of the soil set up by the drying action of the gas. This perhaps in the future will be developed further, as it is obvious that this condition can only be found very near the actual leak, so that the indication is very valuable.

GASHOLDERS.

It is a general observation that holders in tropical or subtropical climates have a heavier corrosion rate than those, for example, of Great Britain, where the variations of day and night temperatures are relatively low. Cases are known of holder crown trussing being seriously weakened after about seven years. As temperature change from day to night can hardly be held responsible in itself, we are led to conclude that the

[3] A.G.A. Convention, 1928. "Changing-Over from Manufactured to Natural Gas."

real cause is the heavier deposition of water during the cooling off. If this is the case, we must also conclude that even the more moderate conditions of the majority of our holders are only relatively less damaging, and that anything which will help to avoid the condition described will be beneficial, and will protect the very large investment which a holder represents.

Other conditions allowing, there is a strong inducement to perform dehydration at the holder inlet. The rate of input is fairly constant and the plant cost is naturally cut down as compared with a plant placed at the holder outlet, which must be capable of dealing with the maximum hour's output to the consumer. Then there is the matter of giving the holder the protection of the dry condition of the gas, as far as possible. As you are all probably aware, it has been established that a floating film of oil on the holder water will prevent re-saturation occurring, except for a few per cents., which we find to be mostly due to diffusion through the film. There is not much more to say on this point, except perhaps that it is found that old coats of paint will resist entirely the action of the oil, which picks up a proportion of light oil, of course, from the gas. As the oil is quite likely, sooner or later, to get to the outside of the lifts, there has been a proposal to use oils coloured to match the paint, so as not to disfigure the latter.

All this is, of course, beside the point where, as is the case with many of your members, the holder is a dry one. Information as to the performance of the dry holder on dry manufactured gas has not been available so far, but it can surely be claimed that every dry holder should store dry gas. The two are complementary. The means of removing condensate from the sealing tar have already been a matter of concern, and it would be clear advance to have no aqueous condensate. This is so at any season of the year, and more so during the winter.

Dehydration after Holder.

Cases have arisen where it has been found advisable to place the dehydration plant after the distribution holder. The general rule is followed that the capacity should be estimated at the actual hourly rate during peak output, except that the re-conditioning of the absorbent is carried on at a uniform rate. A large stock of absorbent is held, so that the peak is met by a good reserve of the reconditioned liquid.

Resistance to gas flow through the absorber is kept in one case as low as one and a half tenths of an inch. This is important, as many wholly low-pressure lines are already taking full-holder pressures during the peak period. In spite of the heavy peak load, the dehydration performed by these plants is as efficient as in the case of the holder inlet plants, as the small rise in moisture content through the holder is avoided.

It may be mentioned at this stage that, in practically all our plants placed at the holder inlet, a slow horizontal moving rotary washer of the Holmes brush type is used. A process of this description, where very little attention is required daily, is well suited by a washing machine of this character, which on account of its low mechanical speed requires in itself little attention, and does not involve much wear and tear and subsequent maintenance work. Apart from this, however, there is another advantage.

According to the modern practice in the construction of such machines, the drive is placed centrally between two equal halves, which gives a convenient arrangement where it is desired, as is generally the case, to follow up the dehydration process by the complete removal of naphthalene by absorption in gas oil. It appears to be proved that a considerable economy in the quantity of gas oil is thereby obtainable, as, without the previous dehydration, condensation of water occurs in the machine and reduces the efficiency of the absorption. This is chiefly important to such works as have no carburetted water gas, and therefore have to dispose of the oil at a slight disadvantage.

An interesting case was quoted in the discussion on Harris' paper, previously mentioned, where it appears at first sight that plant at holder outlet might have been supplied with advantage. In this case there were two holders, of which the crowns were untrussed, and which were provided with a stationary wood construction to support the crowns when deflated. The volume of the actual wood approached 1000 c.ft. per million c.ft. of gas storage capacity. After dehydration began, no effect was observed at the holder outlet, and after some time observations began which were designed to find the rate at which the water was being removed from the wood. The early days of operation fell in the winter, and it was found that complete re-saturation was at first taking place. Within six months the proportion of re-saturation dropped to 40 p.ct., and in a year to 23 p.ct. These figures include, of course, the re-absorption of water through the oil film, so that the effect of the timber is less than they show. The company on whose works these holders are situated is one which has since shown most remarkable results in respect of diminution of service complaints; and the staff speaks with warm appreciation of the benefits of dehydration.

Dry Corrosion.

A certain amount of attention was at one time drawn to the so-called dry corrosion of iron by manufactured gas. Certain cases were mentioned, particularly in gas from high-pressure lines, and containing probably more CO than the average, where incandescent mantles and other fittings developed a brown stain.[4] This, on examination, was found to be attributable to the presence of iron carbonyl in the gas, produced by the combination of the CO with iron in the dry state. This was clearly a matter for attention on the part of those interested in dehydration.

It was found in the laboratory that iron carbonyl formation required an extremely low space velocity—far lower than any normally allowed in distribution practice may fail to provide a recognizable trace. Also it was found that the iron, besides being dry, must be clean to a degree which is unlikely, except in new pipes. Then, when an actual case of iron staining of mantles occurred in a dry system, an accurate confirmation was obtained of these observations.

Stained mantles appeared within a few hours of connecting the first consumer on a new extension of some 2000 yards. The gas had been stagnant in the pipe until consumption began. Later, mantles took the stain more slowly, and in the meantime other consumers taking the gas reported similar stains. The condition gradually passed away, and with normal consumption should not re-appear. Only one other case has been observed, and here again it was on a new pipe line. This also was of short duration. As a precaution, however, against the remote chance of recurrence, the new pipes are now either oiled or painted before the joints are made. This practice is, of course, not confined to dry systems, but is common where it is desired to avoid corrosion in wet areas.

Life of Dehydration Plant.

It would appear at first sight that the nature of the proposed absorbents, which are saturated salts of strong acids and bases, is such as to promote corrosion of the fabric of the dehydration plant itself. This, however, is far from being the case. The high saturation of the salt solution implies a low degree of ionization; and, as a matter of fact, the absorbent exclusively used on the British plants is less corrosive to iron and steel than the average city water. This is, of course, the experience of the refrigeration engineer, who employs calcium chloride brines in circulation in iron, steel, and brass vessels. Even with access of oxygen from the air, the concentrated solution is safe. This is shown by the fact that the evaporator employed, which consists merely of a stack of steam-heated cast-iron pipes over which the absorbent flows, is, we find, capable of years of service.

Where traces of the absorbent have been found to carry up to the outlet pipes from the absorber, these traces are seen as minute beads on the metal. On removing them there is no sign of attack, nor is the general surface of the metal at all altered in appearance.[3] Naturally, the thing which is to be guarded against is exposure to air under such conditions that great dilution occurs, but the condition does not arise when in operation.

There have been, of course, various minor difficulties to surmount in the designing and putting to work of this now considerable number of plants, but it will be agreed that such development work could not escape its share of petty problems. These other points were generally of a character specific to a particular installation, and do not arise in a general discussion of dehydration in practice. It is hoped that the above description of the more relevant things covers those difficulties which will have presented themselves in the minds of most of us from time to time.

Some Records from Practice.

The curves shown in figs. 3a and 3b are taken from the office records of the gas-works in a city of 50,000 inhabitants. The annual gas made is given as 520 million c.ft., and the disposition of the consumers is roughly indicated in the diagram, fig. 4. The central area contains a complex of new and old pipes, which renders it practically uniform in pressure and, as the observations show, in dryness. Only at the extremes of each of the radial mains is there any sign of water deposit, and, as this is an observation which has been confirmed in other towns, it is probably connected with the absence of positive gas flow sufficient to carry off accidental inward leakage, or perhaps old water deposits. This district, therefore, is dry in the sense which has been considered desirable; that is, that the dehydration treatment need not be any more severe than will ensure absence of condensate.

A glance at the records of service reports will show that there has been a clear gain of a most valuable character against all the reported causes of stoppage. Also, the cessation of water deposits has not been accompanied by a rush of dust into the service pipes. It may be added that unaccounted-for gas remains at a normal figure, in spite of the carrying of higher pressures on the average, as business has grown. The case given here was cited earlier.

A similar curve, fig. 5, is given, embracing all complaints, for a residential and holiday town on the sea coast, with a

[4] Blake, Wales and Mon. Junior Gas Association, March, 1927. "Gas Journal," Vol. 177, p. 749.

different seasonal load. Here the results are also beyond question.

A third case is that of a large city with 64,000 consumers and an annual make of 2700 million c.ft. Of this quantity,

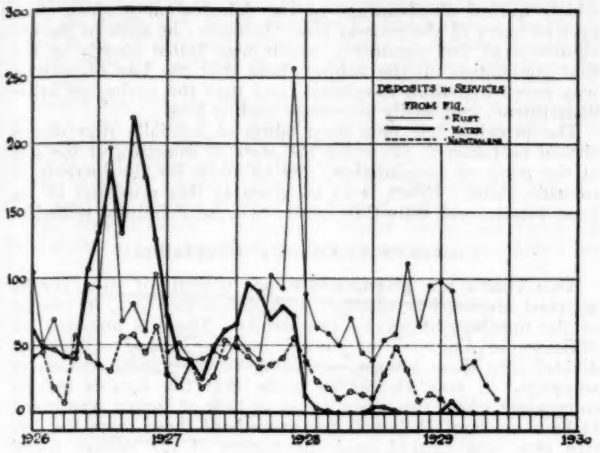


Fig. 3a.

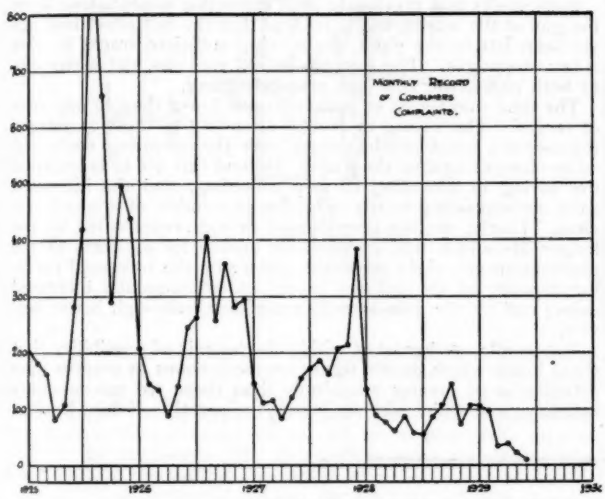


Fig. 3b.

only some 65 p.ct. has hitherto been dried, and still the complaints chart shows a reduction of 60 p.ct. over the whole area.

The average reduction in complaints all round for all plants was formerly cited as 60 p.ct. More recent figures show this saving rising up to 80 p.ct. To avoid a possible question as

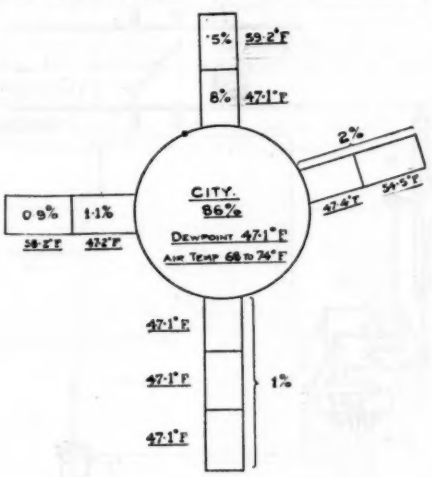


Fig. 4.

to the cause, the earlier figure was based on works most of which had practised naphthalene removal for some time, and were already benefited in this respect.

I would also like to mention specially the smallest plant hitherto installed. This was put in for a works of annual make only 38 million c.ft., or (say) 180,000 c.ft. at maximum day. Not only has the plant been successfully operated for a year without any trained chemical attention, but it was most successful in giving relief during our unprecedented frosts of this past winter. As gas lighting is in use in the streets of this town, and stood up to temperatures below zero when neighbouring towns went into darkness, the severeness of the test will, I think, be appreciated.

The question of safety from frost stoppages is one which will interest American works more keenly than British. The writer obtained some time ago a set of curves showing ground temperatures at 3 ft. below surface, in a New England city. Though the extremes are much wider than we normally expect in England, they are not so wide that the dehydration plant cannot take care of them. It must be remembered that the results obtained on the absorption type of dehydration plant are sensitive to the atmospheric conditions; being governed practically entirely by the temperatures of the inlet gas, and that of the available water supply. The immediately obtaining air temperature makes itself felt indirectly through these two factors, and also directly to a minor degree. Sometimes, in very cold weather, it is advisable to dispense with cooling water on the stacks.

It should be put on record that special reports were obtained from all dry areas immediately after the heavy frost of February, 1929, and that all the officials replying commented in the most striking manner on the immunity from stoppages, as compared with conditions in neighbouring areas. One engineer stated, at the annual meeting of stockholders, that the dehydration plant was one of the best investments the Company had ever made.

High-Pressure Distribution.

One of the larger plants has been installed on a stream of coke oven gas, not purified from sulphur, which is sold to a gas

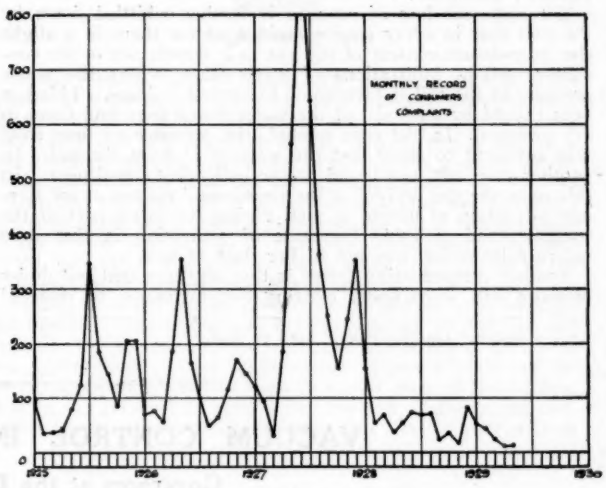


Fig. 5.

company. Two or three years ago, it may be stated, this high-pressure line was coming to a standstill on account of the heavy deposit of naphthalene and water. A partial clearance was made, and a combined unit for dehydration and naphthalene removal installed. Since then, the main is gradually clearing itself, and an increased flow of gas is obtained at the initial pressure. The increased sales are in themselves the justification of the installation, and in time it can be predicted the carrying capacity will be equal to that of a new, clean main, and will remain so.

In this case, the dehydration is carried out at low pressure, before the compressor. Experimental work is now pending on treating the compressed gas with the absorbent, to perform the dual process of cooling the gas to its temperature before compression, at the same time lowering the dew point by the absorption of the water vapour. As the gas expands it will, of course, exhibit a still lower dew point, according to the familiar principle. Thus the dehydrating effect of compression will be obtained without incurring the heavy condensation in the pipe line which is usual.

Another combination which is to be tried-out shortly is the dehydration of the gas on the send-out lines from a large works in Holland, dividing the absorbent into two streams, one for the low-pressure and one for the high-pressure gas. A central storage cooling and re-concentrating station will be installed, and one of the absorbers will be 50 or 60 yards away from this station, the other being near at hand.

It is hoped that the relatively light steel pipes, which are being put in in many places for high-pressure gas, will have a much longer life and a higher carrying capacity than would be the case if condensation of water is permitted as at present.

Loss of Volume

Probably one of the most general deterrents to the adoption of dehydration has hitherto been the loss of revenue that has

been calculated, as a consequence of removing the water vapour and reducing the volume. The standard method of test for determination of calorific value prescribes the use of a wet meter, which will show a greater volume than the consumer's meter, for the same number of B.Th.U. passed. This difference is generally stated to be about 1 p.ct., when dehydrating at works to 40 p.ct. humidity, a quite usual figure.

There are, however, some other considerations which modify this argument, and in some cases it has been proved that the difference, or loss of revenue, may be very small, without in any degree impairing the case for dehydration.

The first of these considerations is that at some period of the year, the seller of gas is already at a disadvantage; that is when the gas at any point of its travel gets below 60° Fahr. Apart entirely from the effect of the contraction by cooling, which may be recovered if the consumer's meter is at 60°, there is an error in recording volume of standard gas. If the gas has left the works at a higher temperature there is condensation in the line, and each c.ft. of water pumped from drips represents 1250 c.ft of gas for which the seller will not be paid. The loss of volume produced by dehydration is not peculiar, therefore, only to artificial dehydration, and therefore cannot be wholly counted as a charge thereon.

The cost of pumping the water from drip collectors may be small, but it helps to balance the account. The greater argument is, of course, that to condense the moisture in the distributing pipes is not likely, in the long run, to prove more economical than to extract it at the works.

It has just been stated that the condensation is set up mainly at a portion of the year. The remainder of the year, when the ground is warmer, gives a slight advantage, but it is on a lower load, and it is probably quite a short period when the consumer is actually paying for a trifle more volume than the B.Th.U. stand for.

The apparent loss of revenue is further whittled down by the fact that in every case examined so far there is a slight rise in moisture content of the gas as it travels out to the consumer. Slight infiltrations of water occur where the water pressure in the soil is favourable to inward leakage. This has been proved by analysis[5] of the water found here and there in dry systems. In the case quoted, the presence of lime salts was sufficient to show that the water was from the soil. In another case salt was found as the indicating constituent. In this case, the gas arrived at the consumers' meters at an average saturation of nearly 70 p.ct. during the latter part of the summer, and probably the state of saturation in that area before dehydration was not higher than 85 p.ct.

Another compensating factor is that any gas sent out under pressure will, even under existing circumstances, be metered mostly under low pressure, and in a partly dry condition. Loss by dehydration can only start from this point, therefore, on such streams of gas, and is to some extent minimized.

It must be admitted, however, in spite of these representations, that this matter of loss of volume has been the most widely quoted disadvantage of the dehydration process. The present users of the process have, however, in spite of the obviousness of the argument, which was stated clearly in the first publication on the subject, held that the loss of revenue was much less than calculated, and that the saving on other departments can easily submerge such a loss.

The principle has now been admitted officially that means should be taken to allow for the state of moisture of the gas at the point of consumption, and to allow for the increase in calorific value. Effect is to be given to this provision in the near future, and thus this matter will be definitely settled.

Charts of Consumers' Complaints.

Two charts are given, which are typical of the results attained on districts supplied with dehydrated gas, in respect of the numbers of service complaints. There is an admitted difficulty in diagnosis of causes, but the second of these is divided into three groups, according to the various causes of stoppage. A note should be made that the figures include complaints where the actual cause of lack of supply was found to be a mechanical defect, but in each of these cases the service pipe was cleared, and the nature of the deposit found therein was reported. The first includes in one figure the stoppage complaints from all causes.

Both works had previously been extracting naphthalene from the gas at the works, but it is clear that the full effect had not yet been felt in the pipes, there being sufficient traces to give a few stoppages. The gas was mixed coal gas and water gas in both cases, the coal gas preponderating.

The total number of stoppages is now lower than in any year of record. The saving in cost of attending to these stoppages represents a considerable margin over the operating costs and other charges against the plant. Beyond this are to be counted the saving in attending to drip collecting, and the increased sales corresponding to the reduction in number of stopped services. Lastly, are the unevaluated savings represented by the longer life which will undoubtedly ensure for all parts of the distribution net, right up to the meter; by the increased carrying capacity of old and new pipes, and consequently increased sales; and by the gain in public confidence through better service.

Taken all together, it is within the bounds of possibility that these items which do not figure on the account at present may actually be of greater magnitude than those we can precisely estimate, and which already justify the practice of dehydration.

[5] A. Marsden, "Gas Journal," April 25, 1928.

VACUUM CONTROL IN THE RETORT HOUSE.

Governors at the Dawsholm Gas-Works.

In his paper before the North British Association of Gas Managers—see "Journal" for Sept. 25, p. 682—Mr. J. F. Harrison explained the care which is taken at the Dawsholm Works of the Glasgow Gas Department to ensure level-gauge conditions in the retort house. He gave a description of the various governors installed.

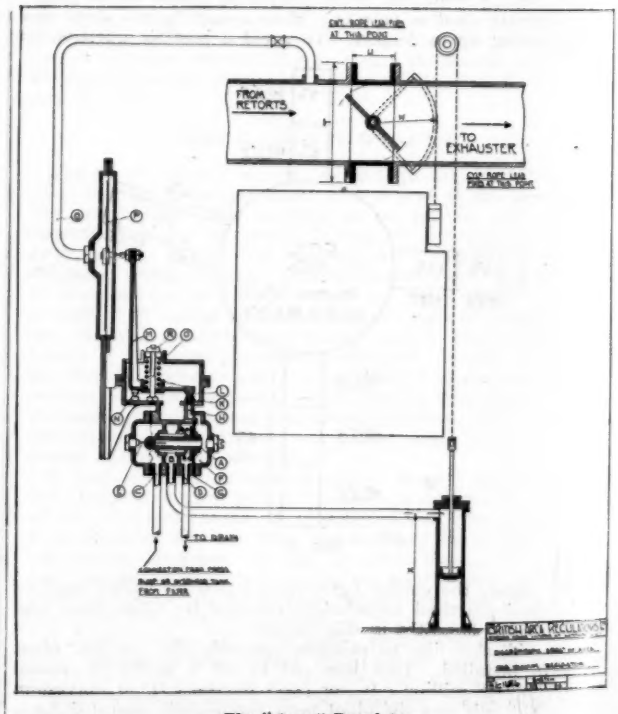
Three types of regulators have been used—(1) the "Arca," (2) the "Askania," (3) the Peebles. The principle of each is the same. A throat of about 50 p.ct. of the area of the pipe is introduced in the offtake, and provided with a butterfly valve fitting the throat with more or less accuracy according to the opinion of the designer. The valve is hung on a spindle passing through packing glands, which is operated by some outside and relatively powerful medium controlled by relay devices.

The medium used by the "Arca" is a head of water, by the "Askania" oil under pressure, and by the "Peebles" air under pressure. The results are practically the same, but the cost of the medium in material and power deserves careful consideration, as well as its behaviour under climatic influences.

The "Arca" governor consists of a butterfly valve in the throat of the offtake W connected to a quadrant outside the main. A weight is hung on the quadrant tending to close the valve. This tendency is resisted by the single-acting cylinder X. The cylinder is connected to a relay valve by the pipe B.

The relay valve consists of a piston valve A separating the pressure supply C from the control chamber F formed of the diaphragm G and the casing. Pressure water from C is admitted through the piston A to the control chamber F, and by the nozzle K to a drain. The large diaphragm P is attached to the kneed lever M rocking on the fulcrum N and reacting against the adjustable spring R by which the pallet L is maintained on or near the nozzle K.

The back of the diaphragm P is influenced by the vacuum in the offtake through the pipe Q. The spring R is adjusted



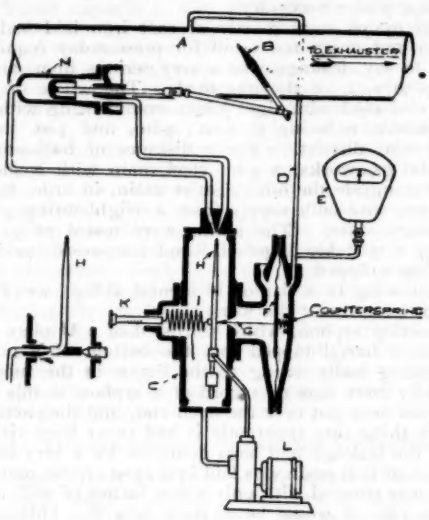
The "Arca" Regulator.

against the diaphragm to give the pull required in the offtake when it passes a small stream of water through K. Should the pull be right, the flow through the nozzle K is constant and no motion ensues. Should the vacuum fall, the spring predominates, reduces escape at K, and increases the pressure behind the diaphragm in the chamber F, which moves the piston valve A to the left and admits pressure to cylinder piston X, which opens the butterfly W and allows a greater pull from the foul main.

Should the vacuum increase, the diaphragm P is moved to the left, the nozzle K is opened, pressure in F falls, and B is connected to the overflow D, permitting the weight to overcome the pull of the cylinder and close the butterfly.

The water is carefully filtered before admission through C. The needle E is used to limit the flow of water.

The four Reavell "Askania" retort house governors at Dawsholm are of the standard low-pressure type in which an



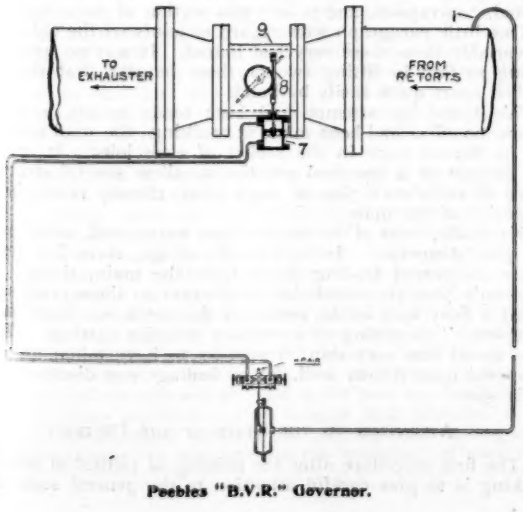
Reavell's "Askania" Governor.

oil jet tube H is arranged to swing on pivots in a horizontal plane. The oil enters the jet tube at a pressure of from 40 to 60 lbs. per sq. in., through one of the pivots, which is hollow, and issues at the tip as a high-velocity jet. This impinges on two small orifices situated side by side in the distributor on the front of the regulator. The two orifices are connected to opposite ends of the control cylinder M.

When the jet is in mid position the pressure is equal at both orifices and on both sides of the piston P, but should the jet deflect to right or left the pressure will rise on one side of the piston and fall on the other, causing it to be set in motion. The motion is communicated by an ingenious system of levers to the butterfly valve B, which opens or closes the throat in the offtake pipe accordingly.

The jet H is controlled by a leather diaphragm F connected to it, which is subjected to the pressure in the retorts through the pipe D connected to the offtake at A. The force on the diaphragm is balanced by the resistance of the spring I and the counterspring, which enables the regulator to be set for *plus* or *minus* pressure as required.

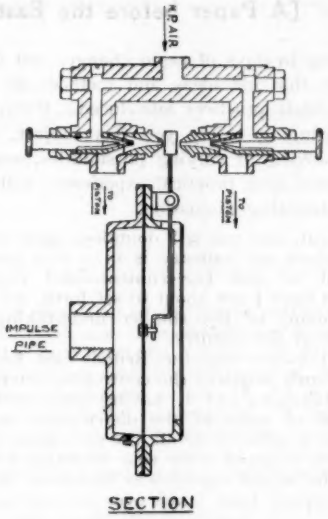
If the make of gas increases and the pressure rises in the offtake, the diaphragm will move the jet to the left. Oil will enter the left-hand end of the cylinder, causing the valve B to



Peebles "B.V.R." Governor.

open, and restore the pressure to the correct value. The regulator may be set for any pressure between *plus* and *minus* six-tenths water-gauge.

The high-pressure oil is supplied by two direct acting pumps (one of which is a stand-by) driven by steam, situated some distance from the governors and connected thereto by flow and return pipes.



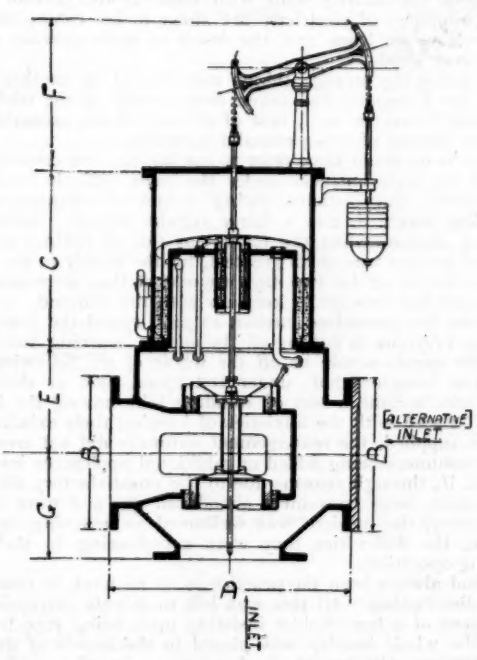
SECTION

"B.V.R." Relay Valve.

In the Peebles butterfly valve relay governor (B.V.R.), the spindle of the butterfly valve carries a grooved wheel around, and attached to it a flexible rustless wire rope passes. The two ends cross and are attached to the vertical piston rod of a double-acting cylinder placed tangentially to the grooved wheel. As the piston moves in or out the wheel is rotated.

The relay valve consists of a small circular chamber carrying a thin diaphragm connected by a control pipe to the offtake main on the closed side, and to a regulating spring and light lever on the open side. The lever carries a double-faced pallet at the other end, which plays between two nipples.

Air at 5 to 10 lbs. per sq. in. pressure is laid on to the cylinder and nipples. One nipple controls the pressure on the top, and the other the pressure on the bottom of the piston in the cylinder. Accordingly, as the diaphragm is deflected in or out the lever and pallets are moved towards one or other of the nipples, causing the pressure to build up on the side of the piston controlled by the nipple which is least open, and to escape from



Peebles Retort House Safety Valve.

the other nipple. The differential pressure thus produced in the cylinder moves the piston and butterfly valve accordingly. The pull is controlled by adjusting the spring.

Mr. Harrison mentioned that a Peebles safety-valve is provided for each bench.

SOME NOTES, FROM A DISTRIBUTION STANDPOINT, ON THE TRANSFER OF SMALL UNDERTAKINGS.

By E. W. Bonsey, of London.

[A Paper before the Eastern Counties Gas Managers' Association, Oct. 9.]

We are living in days of rapid change, and it is becoming very necessary that old ideas and methods be scrapped and new and up-to-date practices introduced. I therefore offer no apology for bringing before you this subject, as nothing is ever lost by looking at varying possibilities, and I trust that this paper, based upon practical experience, will be the means of evoking interesting discussion.

I am confident, and you will doubtless agree with me, when I say that before our industry is in a safe position to meet the onslaught of our Government-aided rival, electricity, alterations, on lines I am about to set forth, will be needed in the case of many of the smaller undertakings situated in different parts of the country.

You are all aware that the British Gas Light Company, Ltd., have recently acquired the controlling interests in a number of undertakings; and I, having been charged with the re-organization of some of the distribution departments involved, propose to give, in detail, the procedure adopted. First of all, however, I would crave your attention for a short time on some of the actual experiences found on various districts where my Company have taken over controlling interests.

Strange Mainlaying.

1. During the process of relaying a main through the market place of a small town with 4-in. pipe, we discovered a ½-in. service tapped into a 2-in. main. This ½-in. service was fixed by means of some kind of packing into a short piece of 2-in. pipe, and into the other end of the 2-in. pipe a piece of 1-in. pipe was fixed in a like manner, finally reduced again to ¾-in. This service had been trying to supply 70 lights and a heating stove. There was also another 1-in. service tapped into this main by means of a male elbow, which supplied a different part of the premises in question. On Saturday during the winter months, the effect of this shop lighting up caused the houses and shops in an adjacent street to be practically in darkness.

2. Another consumer was found to have a 1-in. service at the meter inlet, but, upon examination, we found this to be actually fed from a ½-in. pipe tapped into the main.

Needless to say, these defects were rapidly remedied; but had this particular company remained under the old régime it is doubtful if anything would have been done, and it would have gone particularly hard with them at the present time, as the suppliers of electricity are about to lay cables into the town. Now we learn that the result of their canvass so far is not very good.

The following strange things were found in another town where my Company had taken over control of the undertaking; and it may be well, first of all, to tell you something of the past history of this particular company.

There is no doubt that, prior to our taking over control, they carried on their business under the most difficult conditions imaginable. For instance, owing to lack of adequate manufacturing plant, it was a fairly regular feature, during the summer season, when the town was full of visitors and the demand for gas was at its greatest, for the supply to the whole town to be cut off for two days a week, as they were unable to make gas fast enough to keep up with the demand.

It was the recognized custom to send round the town crier the day previous to cutting-off the supply, warning consumers that the supply would be off the whole of the following day. One can imagine that, under conditions such as these, the gas-works became a sort of standing joke among the inhabitants. Faced with the anxieties of keeping their existing customers supplied, the management naturally did not encourage new consumers being added or additional appliances installed; in fact, if, through reasons due to the unsatisfactory nature of the supply, large consumers abandoned gas and went over to the enemy, the incident was welcomed as lessening, in some degree, the difficulties they were experiencing in their gas-making operations.

It had always been the practice to do no work in connection with distribution. All this was left to private enterprise. In the event of a householder insisting upon being supplied with gas, the whole inquiry was placed in the hands of the local ironmonger, who would, in due course, lay the service pipe, fix the meter (which the consumer would have to purchase), and do any interior work that was required; the whole cost of the job being charged up to the consumer. Hiring of appliances was distinctly discouraged; any cookers or fires that were required would have to be bought outright.

In these circumstances it was not surprising to find very curious examples of district work. The local ironmonger, of course, had an entirely free hand, and was not supervised in any way in regard to the character of the work he executed.

The first thing we did after taking over control was to recommend the Board to scrap the whole of the existing distribution system and lay entirely new mains throughout the district. This was agreed to, and the work has recently been completed. At the same time, it was arranged to relay every service pipe where necessary.

The old mains were mostly of cast iron laid badly many years ago and much too small for present-day requirements. Needless to say, leakage was a very serious item, amounting to nearly 30 p.ct. of the gas made. The whole of the new mains are of steel with rigid joints, commencing with 8-in. at the gas-works, reducing to 6-in., 4-in., and 3-in. in various parts of the district. For a distance of half-a-mile after leaving the gas-works, a 4-in. steel main with welded joints was laid alongside the 6-in. district main, in order to prepare for high-pressure bulk supply from a neighbouring gas-works at a future date. The mains were tested at 30 lbs. per sq. in. by a portable Ingersoll-Rand compressor prior to the joints being wrapped.

The following is a list of incidental things we discovered during the progress of the work:

A self-acting syphon, which consisted of a **U** piece of 1½-in. wrought-iron barrel tapped into the bottom of a main, was found leaking badly owing to the liquor in the tube having evaporated; there was no record of a syphon at this spot. A jam jar had been put over the open end, and the earth covered the whole thing up; apparently it had never been visited, and probably the leakage had been going on for a very long time.

A 3-in. cast-iron main was laid in a most erratic manner. In places it was covered with only a few inches of soil, and then, within 20 yds., it would be as deep as 5 ft. This main was laid almost directly out of the works entrance, and proceeded up a steep hill. In the middle of this steep hill we found a syphon, and it has been suggested this was placed to catch the morning dew, as it could not possibly serve any better purpose.

In the same road we also had a curious experience. In transferring over the services from the old main to new, we received a complaint from several houses in a road running parallel that they had been cut off. Upon investigation we found that, though there was a main in the other road, a service had been continued from one of the houses in another road through the back gardens, and supplied five houses in the rear. What the object of it was it is difficult to conceive.

The old main supplying the High Street was of 4-in. steel with ordinary joints, laid in 1911. The usual method of connecting services to this appears to have been by drilling a hole in the main and fixing a clamp over it, secured by two bolts forming a clip. Naturally, this method did not form a gas-tight joint; most of the clips were found to be leaking badly. In some instances, however, the main had been drilled and tapped to the ordinary gas rate thread, and a connection taken direct from this without using any expansion nipple.

In passing, I should like to remark upon the excellent condition of this main after 17 years' use in bad soil. Under the wrapping, the pipe was as good as new; and though gas full of impurities had been continually delivered through this main, the interior was in splendid condition. In fact, we lifted, tested, re-wrapped, and re-laid this section of main again.

One little paragraph with regard to joints on the old mains: Invariably these were very bad indeed. It was no uncommon thing to find in lifting two or three lengths that the joints pulled apart quite easily by hand.

We found an attempt had been made to use lead wool. Here, no effect had been made at caulking; the wool still being in its fibrous state in the socket of each joint. It appeared to be part of a standard practice to allow several strands of yarn to enter each pipe at every joint, thereby restricting the capacity of the main.

Naturally, most of the service pipes were small, being usually of ¾-in. diameter. In one small cottage, three live services were discovered leading direct from the main, though there had only been the usual slot installation on these premises.

At a busy spot in the centre of the town, we found a 4-in. "special" consisting of a sanitary soil pipe casting. Though the metal was very thin, it appears to have taken the strain imposed upon it very well, for no leakage was discovered near this spot.

Attention to the State of the District.

The first procedure after the gaining of control of an undertaking is to give careful attention to the general state of the

district. The addition of new consumers is not our primary thought, and it is essentially to the existing consumers that our thoughts are directed. With a view to improving the service to the consumer, I acquaint myself with the various mains, and thus start at the beginning of the distribution side.

Having satisfied myself that they are adequate and properly laid, positions of syphons are noted and their conditions inspected, I pass on to services; and, where found necessary, these are enlarged or renewed. I can definitely state that it has been my own experience to find, in a great number of cases, services that are totally inadequate for the loads required. It is, as you know, absolutely necessary to give special attention to these pipes, owing to the increase in sales of gas due to cooking and heating, and to get the best results from the use of the apparatus.

Attention is also given to the registration of gas consumed, and a meter campaign is commenced for the inspection and overhaul of these instruments, and to ascertain that the meter is of sufficient capacity; also that gas is being correctly registered and thereby charged, and that each meter itself is in a position for easy access. Such a campaign necessarily entails the gaining of admittance to consumers' premises, and the opportunity is then taken for the inspection of all lighting installations and appliances. Any defective or obsolete fittings, appliances, &c., are either overhauled or exchanged; and naturally every endeavour is made to introduce new appliances, &c., with a view to assisting the consumer and increasing the sale of gas. Advice relative to all matters of interest to the consumer is readily given. This, as an opening programme of a controlling company, is, I think, the best form of advertisement; and it has been proved that much benefit is derived from this procedure. Such inspection, we hope, enables consumers to gain confidence in the new management.

Upon taking over undertakings, it has been found that, in consequence of the bad state of the mains, services, &c., the leakage figure is a considerable one; but, as you will have already deduced from my foregoing remarks on the special attention given to the distribution system, a marked improvement results in the figure in question.

Internal Organization of Subsidiary Undertakings.

Now a word about the internal organization of subsidiary undertakings. Having set the machinery in motion for external work, I am at liberty to turn my attention to the distribution stores. Here again, I usually find that no fixed routine relative to the issuing of material and recording of such issues has been set. Fitters have been allowed to help themselves. This is a very unsatisfactory state of affairs. First, stock is taken; obsolete and useless material being thrown out and subsequently sold, if necessary as scrap.

I need not emphasize the mistake of carrying stocks that will never be used. Each unit of stock is separated, and as counted placed in a locker to which is attached a numbered bin card defining the contents of the locker.

BIN CARD.

Description of Article. No.

Issued.		STOCK.	Issued.		STOCK.	Issued.		STOCK.
Card No.	Quan'ty.		Card No.	Quan'ty.		Card No.	Quan'ty.	

Spaces appear on the bin card for the recording by the storekeeper of all additions to and removals from the locker. The advantage of such a system will readily be realized, for the storekeeper is able to see at a glance the number of each unit held by him, and also the state of his stock—*i.e.*, whether he is approaching the danger-point of minimum stocks in cases of material in constant demand. I will deal with the actual issues shortly.

For each item in the stores a stock card is made out with columns for purchases, returns to, and withdrawals from, stores. These cards are not, however, of one colour. It has been found that three colours suffice, though further colours could be introduced to suit individual requirements. The colours I use, and their representations, are indicated.

These stock cards are kept in strict alphabetical and size order; each colour being separated and sub-divided by guide cards. At this point I would mention that the standardization and appropriation of material greatly facilitate the allocation of invoices for purchases; and, of course, such allocations are strictly adhered to. No doubt you are thinking that in some cases material can be bought and allocated to one of the aforementioned sections, but used on work falling under another category. I will refer to the treatment of such cases later.

Yellow Cards.—All materials used on lighting installations (allocated Rent of Fittings).

Brown Cards.—Material used for cookers, fires, and other apparatus used for heating, &c. (allocated Gas Stoves).

White Cards.—Service material (allocated Services), meter fittings (allocated Meter a/c), and sundries in connection with repairs and maintenance on district (allocated Wear and Tear Distribution).

STOCK CARD.

Description

Stock Taken | Min. Stock.

IN.			OUT.			
Date.	How Received.	Quantity.	Date.	Order No.	Quantity.	Stock.

For the correct recording of all goods purchased, a Goods Inwards book is introduced. The storekeeper is responsible for the entries in this book, and the checking of all receipts with the actual goods ordered, and, for this purpose, a duplicate of every order sent out is passed to him by the clerk or official responsible for the ordering of material. A section of this book is kept for goods returned to the various firms, &c., empty cases, &c.; and thus an entry is made for all goods entering or leaving the stores department—a very useful and necessary procedure.

Let us now pass on to the issuing of materials from the stores. In the first instance, before any work is undertaken, a work ticket is made out in duplicate by the inspector, stating the nature of the work required to be done; and, at the same time, a work card is made out, requisitioning from the stores the material required.

69000 Date entered.....

NAME AND ADDRESS.

COMPLAINT.

Date completed.....192

Workman's Name.....

69000

Workman.....

Date given out.....192

Ticket No. | B 2235 | Gas Stove

Date.

Name .....

Address .....

WORK TO BE DONE.

.....

.....

Inspector's Report. .....

Workmen's Name	M	T	W	Th	F	S	T'l.	R'te	£	s.	d.

Cost of Labour . . . £

REMOVED.

Date received in Stores.	Quantity.	Description.	Received by.

MATERIALS REQUIRED. (Reverse of above card.)

Description.	Size.	Number Issued.	Rate.	£	s.	d.	Issued by
Total . . . . . £							

RETURNS.

Description.	Size.	Number Returned.	Received by

These work cards are also printed in colours similar to the stock cards. I will, to refresh your memories, reiterate the class of work for which each colour stands, though it will be observed that there are minor deviations:

Yellow (Y).—Repair work to, or changing, prepayment fittings, and changing of Meters.

Brown (B).—New installations in connection with cookers, fires, and other heating and cooking appliances, changing such appliances, repairs, and overhauls *in situ*, and all sundry work in connection with these appliances.

White (W).—Laying, re-laying, and repairing services, fixing meters and new installations, new and additional prepayment fittings; laying, re-laying, and repairing mains, and all sundry work falling under the heading of Wear and Tear Distribution.

The foregoing colours represent work carried out free of charge by the Company.

Green (G).—For all classes of work chargeable to the consumer.

These cards are at first held by the storekeeper, and as goods are issued to fitters, &c., he initials the entry made by the inspector on the appropriate card for the job. It will be appreciated that the nature of the work to be done decides the colour of the work card made out.

The advantage of the early passing of the work cards to the storekeeper is that, when the fitter presents his work ticket at the stores, he finds that the necessary material is already collected for him, and thus a saving of time is effected. The work ticket bears the corresponding work card number, and no confusion therefore arises between the jobs. Upon completion of the work, the fitter hands the ticket back to the office, when it is cancelled by a date stamp, and the work card is then withdrawn from the stores for costing purposes. It should here be mentioned that surplus material is returned to stores, and the work card duly credited in the provided space. Old material and appliances are also noted on the work card.

Posting to the stock cards is carried out by the clerk from the work cards; and here I must refer to the transfer cards I spoke of a short while back.

When the clerk, who is conversant with the allocation of material at time of purchase, notices that certain classes of material—(say) under the heading of gas stoves—have been used on a job which is allocated, for example, to Wear and Tear Distribution, he immediately makes out a white transfer card, which is an ordinary stock card, with the word "Transfer" printed upon it for distinguishing purposes.

Description

TRANSFER.

Credit

Date.	Order.	Quantity.	Date.	Order.	Quantity.

At the end of the quarter, or other desired period, the value of such entries on transfer cards is arrived at, and the necessary adjustments are made in the accounts concerned. It will be understood that no entry in the case of a transfer is made to the ordinary stock card at the time, but only at the end of the quarter, half-year, or year, when deductions are made in total. If at any time the actual stock of any unit is required between the above-mentioned period or periods, this is arrived at by deducting the last number appearing on the transfer card, and/or cards from the corresponding stock card. The transfer cards are filed with the stock cards. I hope I have made myself clear.

May I for a brief moment return to the stores, for I find that I have made no mention of checking of stocks? A practice is made of periodically checking contents of bins with stock cards, and at the same time comparing the bin card figure with that on the stock card. By working systematically through the stores, every item is checked; and when the time comes round for valuation of stocks, it is only necessary to abstract from the stock cards the totals at the period concerned, and value in the usual way, thereby saving valuable time.

Actual specimens of the various cards, &c., that have been mentioned, are available for your inspection.

Recording Fitters' Time.

I must now explain the method adopted for the recording of time taken by the fitter on all classes of work, and must take you back to the works cards, upon which, you will remember, issues from stocks are recorded. A space is allotted on these cards for the posting of daily times spent on the job by the fitter; and for this purpose, as well as for the compilation of wages, a daily time-sheet is brought into use. The fitter enters on these sheets the time spent on every individual job on which he is engaged, giving addresses, work card, and ticket references.

Upon examination of these time-sheets, it will be noticed that columns appear headed, "Meters," "Geysers and Cookers," &c.; and in these columns the fitter allocates his time. In addition, the fitter invariably gives a brief description of the nature of the work carried out. These cards are also used for the necessary alterations, &c., of rentals and records. I refer to change of appliances, new installations, removals, &c. It will be appreciated that the use of these cards makes the costing of all work a very simple matter, and enables a watch to be kept on costs. Jobs, of a similar nature, carried out at different times, can be compared, and any difference worthy of note taken up with the fitter, having regard to the nature of ground, &c., in the case of mains and services, and

Notice.—No Time will be passed unless Card and Ticket Numbers are shown against each Job.

(Outdoor Dept.)

DAILY TIME SHEET.

Day..... *Date*.....192....

	Name.	Clock No.
Fitter		
Youth		
Labourer		
Labourer		

Consumer's Name.	Consumer's Address.	Card No.	Ticket No.	Time Arrived.	Time Depart	Number of Hours Fixing— Meter.	Appliances on Maintenance.	Main or Service.	Fire, Cooker, Geyser, Ring, or Griller.	Fittings off Ordinary Meter.	Fittings off Slot Meter.	Repairs to Slot Fittings.	Time. Fitter.	Youth.	Labourer.	Total for Day.
					Totals											

the varying difficulties experienced in other branches of fitting work. All work cards are numerically filed upon completion.

A buyer's card system is also inaugurated, and, as in the case of stock cards, each unit is allotted a card. Upon this card is recorded the date of the purchase, name of supplier, cost price, discounts (if any), and selling price. These cards are used for the valuing of materials on work cards, stocks, and checking of invoices, and also prove very useful for arriving at estimates for work of a chargeable nature or otherwise.

Description of Article. Bin No.....

Date.	Supplier.	Rate Per	Gross Cost.	Rate of Discount	Net Cost.	Selling Price.
.....	.....	....	.....	.....	.....	.....
.....	.....	....	.....	.....	.....	.....
.....	.....	....	.....	.....	.....	.....

It occurs to me that there may be passing through the minds of some of my listeners thoughts that such a system as I have briefly outlined is elaborate and complicated, and how is it possible to operate it in a works whose staff consists of a works manager and a stoker.

My answer to this is that, owing to the amount of work we find is required to be done after our investigations, it is always necessary to engage at least one additional employee. This we do, and endeavour to find a man who is not only suitable for fitting work, but who is competent to do clerical work. He is able to make out the necessary work tickets and their corresponding cards, and to keep records of stocks on stock cards; the whole of this work being under the direct supervision of a district official who arranges the costing of the jobs and also has a periodical check of the stocks made. I venture to say that, provided the individuals responsible systematically carry out their duties, matters run very smoothly and efficiently.

I have mentioned a few experiences as illustration of old methods and up-to-date practice, and in the interest of progress I consider the fusion of these smaller units the right policy. If such conditions as mentioned earlier on, leaving out at the moment the question of pressures, were allowed to continue—as continue they were bound to—it would make one think seriously about the future of these smaller undertakings.

Through the policy adopted by the Company I have the honour to represent, the following increases in consumption have taken place in the companies under my control over the following periods.

"*A.*"—*Sales of Gas—Years Ended June* 30.

—	1927. C.Ft.	1928. C.Ft.	1929. C.Ft.
Total sales	6,271,600	6,241,100	6,774,400
		Decreased Sales over 1927.	Increased Sales over 1928.
		30,500 = 0·4 p.ct.	533,400 = 8·5 p.ct.
Total number of consumers	281	284	286

"*B.*"—*Sales of Gas—Years Ended June* 30.

—	1927. C.Ft.	1928. C.Ft.	1929. C.Ft.
Total sales	8,282,500	8,893,300	9,123,700
		Increased Sales over 1927.	Increased Sales over 1928.
		610,800 = 7·3 p.ct.	230,400 = 2·5 p.ct.
Total number of consumers	395	424	451

"*C.*"—*Sales of Gas—Years Ended June* 30.

—	1927. C.Ft.	1928. C.Ft.	1929. C.Ft.
Total sales	4,770,100	5,171,200	6,271,700
		Increased Sales over 1927.	Increased Sales over 1928.
		401,100 = 8·4 p.ct.	1,100,500 = 21·2 p.ct.
Total number of consumers	304	393	421

"*D.*"—*Sales of Gas—Years Ended June* 30.

—	1927. C.Ft.	1928. C.Ft.	1929. C.Ft.
Total sales	7,601,200	9,232,500	12,323,800
		Increased Sales over 1927.	Increased Sales over 1928.
		1,631,300 = 21·4 p.ct.	3,091,300 = 33·4 p.ct.
Total number of consumers	348	607	662

"*E.*"—*Sales of Gas—Years Ended June* 30.

—	1927. C.Ft.	1928. C.Ft.	1929. C.Ft.
Total sales	36,747,600	34,420,000	36,046,200
			Increase 1929 over 1928. = 4·7 p.ct.
Total number of consumers	1385	1435	1505

In the case of "E" for the half-year ended June 30, 1929 (included in above), the increase is 10 p.ct.

Advantages to the Small Undertakings.

In conclusion, the following points, I think, also prove the advantages that the small undertakings can reap by being controlled by a larger company.

Benefit of Buying.—The special discounts given by the majority of manufacturers to a large undertaking can, by a system of central ordering, be enjoyed by the subsidiary companies; thereby effecting a considerable saving per annum. As an example, at one of our companies we are able to buy certain items by gross lots at a very reduced figure, and the other companies in the vicinity are able to draw supplies as and when required, thereby effecting a saving on this one item of 10 to 15 p.ct.

Benefit to Consumer.—Reduction in the price of gas. This has actually happened in each of the undertakings in which I am interested. Advantage of an up-to-date and efficient service, combined with the supplying of modern appliances; free slot installation work, comprising three lighting points and cooker point; inverted burners complete are given, and an up-to-date cooker with white panel door is supplied; street lighting is taken in hand, and modern burners are installed; also minor advantages too numerous to enumerate in detail.

Greater Satisfaction to Employees.—This is a matter in which my Company pay particular attention, as they realize that to get the best out of your employees, proper consideration must be given them.

Standardization of Calorific Value.—In practically every instance where we have taken over control we find considerable variation in the quality of gas sent out, and we are able at once to bring the quality to a set standard, and to see that it is maintained. This, from a distribution standpoint, is a great asset, and is the means of saving innumerable complaints.

Interchange of Workmen, Clerks, &c., Where Necessary.—By adopting the standard system as mentioned during the reading of this paper, it does not matter if we transfer employees north or south, east or west; they are all able to pick up at once the threads of the work they are sent to do. This applies equally to material. Shortages of material which at times is urgently required, may be made up within a few hours from one of the other undertakings in the vicinity, at the same price and of the same quality as used on that particular job.

Though I have purposely avoided touching finance or manufacture in these notes, I cannot conclude without calling your attention to the benefit of the financial assistance which can be derived by the small undertaking when under the control of a larger company; also the advantages to be gained on the manufacturing side by reason of having the free advice of engineers with expert experience.

There is also the possibility of linking up the small units to units of larger size; but this is too big a question to deal with in this paper.

Discussion.

Mr. F. Prentice (Ipswich) said they were indebted to the author for giving them his experience of what he might be permitted to term the rejuvenation of obsolete works. While this experience was extremely valuable, it was a rather curious fact that some of the methods which were described as absolutely obsolete and futile were not so bad after all. In Ipswich there was a street the houses on both sides of which were bought for a manufacturing concern; and therefore the services, fifteen in all, were capped. They remained capped for about two years. When the road was opened, it was found that fourteen of these services were driven into the main; and every one of them was absolutely sound. The only one of the fifteen that

leaked was screwed in, as they would do it to-day; and this was due to the fact that a few of the threads had not gone home, and rusting had taken place. It was important to see that the threads of a service went well home in the main, and that they were not left to the action of corrosion. He had had some little experience with small works, and also with the amalgamations which were taking place to-day all over the country; and he could quite endorse what the author said as to the benefits of good supervision, constant calorific value, and so on.

Proper Equipment Essential.

Mr. W. W. Townsend (Colchester) said he supposed every member would agree that the paper amounted to an indictment of the management of very small works—rather a serious indictment—and he was only sorry that the author was preaching to the converted. It was quite evident that most of those present had adopted years ago the up-to-date policy which the author recommended. Everything pointed to a fact which was being driven home in so many ways just now—the advisability of grouping small works in some way. This policy was being preached in season and out of season; but at the rate at which they were now proceeding it would take another hundred years. It was very surprising that the managements of small gas-works should be so blind to their interests. They waited until they were up against something like a cheap and abundant supply of electricity; and he was afraid in some cases there would be a rude awakening. The difficulty was inherent, he thought, in the case of the self-contained works, where the manager had everything to look after. It was quite clear that some of the connections, &c., to which the author had referred had not been devised to give trouble hereafter, but simply because the man who had to do the work had little time to spare, and so took the shortest cut. Very often, too, he had not the material required. In any works the man who had to do a job should be equipped with the necessary appliances to carry it out properly. This was a matter that, even when one had red and blue cards, needed to be watched. They were much indebted to Mr. Bonsey for collecting all these particulars, and coming along to give them the benefit of his experience.

The Question of Remuneration.

Mr. C. S. Shapley (Leeds) remarked that he had listened with considerable interest to the paper, because he thought he could claim to have had charge in days gone by of one of the smallest undertakings in their area. They should all feel rather sorry for the managers of small gas-works, because there was too little attention paid to the salaries given them, and consequently it was not always possible to secure the type of man that efficient engineers would desire, in the best interests of the industry, to see in charge of works. Probably the Charter which had recently been granted to the Institution of Gas Engineers would, by raising the standard of the gas engineer, help in this direction; but there was also a duty cast upon the managers of the various undertakings to see that the assistants employed under them were adequately remunerated for their services. Some salaries that one saw quoted in the Technical Press to-day were very much too low for the class of man that was needed for the work. He quite agreed it was desirable that small undertakings should be grouped. The writer referred to calorific value. It was very necessary that the quality should be kept constant, and in the case of the smaller works there was not the same opportunity of accomplishing this as was found in the larger works. This was a very sound argument in favour of gas being supplied as far as possible by larger works.

The Human Element.

Mr. B. R. Parkinson (London) said he had listened to Mr. Bonsey's paper with great interest. Not only had it been given to them in a most attractive and practical form, but they were encouraged thereby to know what was actually being done in the centralizing of small undertakings. Those of them who had had a good deal to do with the management of small works could appreciate the advantages of becoming linked-up to a larger organization, provided always that the administration was conducted with full regard to the human element. Mr. Bonsey had enumerated some of the most important advantages at the end of his paper; and he (Mr. Parkinson) was very glad he had been able to include the reduction in price of gas to the consumer. That was the fitting climax to a system which had its beginning in the adequate provision of capital where capital had so often been sorely needed. Mr. Bonsey had given them in considerable detail his system of cost and stock keeping, the necessity of which all must realize, even for the smallest works. It looked dry on paper, and they marvelled at the man who would have the temerity to enforce it upon that little works with the one stoker and the working manager. But here was exactly where the human element came in. Without that touch of personality that could establish right contact between a corporation or a system and its workers, he doubted if it could be accomplished. The personal touch and inspiration were of exceptional importance in the small works. The manager might often be left to himself for months without assistance or encouragement, and with a responsibility that put a greater strain upon his character than human nature could easily carry. He knew enough of Mr. Bonsey to be able to imagine that his periodical visits were keenly anticipated by the local staff, and that when once they had grasped his system they produced those cards, perhaps a bit grimy, but filled up and in order. And when officials were drafted from one works to another, temporarily, for development, there would be the same tact and consideration which alone could get the best out of all workers. In this he (Mr. Parkinson) believed lay the real strength of the organization. Mr. Bonsey had been modest in his presentation of the case; perhaps in his reply he would tell them from his experience if he (the speaker) was right.

Dr. J. G. Stewart (Letchworth) said that one little point not mentioned in the paper was the great difficulty experienced by the managers of many small works in getting money out of their Directors, who were more obsolete than the works. In these cases he felt very sorry indeed for the managere.

Adequacy of Mains.

Mr. S. B. Chandler (Tottenham) remarked that the paper which had been read proved the benefits of amalgamation. It must be evident to all that great advantage was derived by the consumer from the entry into a district of an undertaking which had at its back not only the capital to run things properly, but also the requisite technical staff. Granted, then, that there were advantages in amalgamation, the steps the author had explained were quite right, because he had tackled a very serious source of annoyance to the consumer—namely, inadequacy of mains. The peak load caused by the large number of cookers in use—especially on Sunday—must be properly provided for, because any insufficiency at this time caused the consumers much inconvenience. To his mind it was essential that, before arranging for the taking on of further consumers, they should make absolutely certain that the mains were amply sufficient to cope with the existing load. The author had not had opportunity to develop in his paper the question of service to the consumer; but this was a matter which must be constantly borne in mind. The size of meter installed was of much importance. Most of them must be accustomed to coming across meters of inadequate capacity supplying various appliances. So that the next step possibly might be to overhaul the meter system, and see that all were of adequate size. Another important point was supervision after fixing. It was of little use getting gas-consuming appliances installed, if they were not looked after subsequently, so as to ensure retention. A dissatisfied consumer was a menace to the undertaking.

Mr. W. Surman (Braintree) inquired whether the author installed high-capacity meters.

Mr. Bonsey replied that when three-light slot meters were taken out they did not always instal high-capacity meters. Frequently they converted them to No. 2 "Standards." They had a depôt at which meters could be repaired, and this conversion could be effected at a much cheaper cost than providing a new meter.

The President (Mr. H. C. Smith, of Tottenham) also expressed his thanks to the author for the many interesting points raised in the paper. The statements contained in it provided ample justification of amalgamation so far as the gas industry was concerned, altogether apart from any benefit to particular undertakings that might be derived from the taking over of small companies. He would like to ask Mr. Bonsey what he meant when saying that "free slot installation work, comprising three lighting points and cooker point, inverted burners complete, are given; and an up-to-date cooker with white panel door is supplied." He supposed these consumers were paying something over and above the price charged to ordinary consumers. What was the extra amount they paid for what was referred to as free installation?

The Author's Reply.

Mr. Bonsey, after acknowledging the vote of thanks, went on to say that, though the coloured card scheme explained in the paper might at first sight appear complicated, with the way in which the whole of these Companies were organized it became a very simple matter. The particular Companies enumerated were all within a radius of 20 to 30 miles; and at one of the offices there was an inspector who went round once a week and collected from the managers the weekly time sheets of the men and work sheets. He took these and priced them out and corrected the cards, which were then entered into the register or ledger. This was done in such a way that at the end of the half-year the particulars could be sent on to headquarters as a series of returns which could be used for drawing-up the balance-sheet. From the point of view of costing, the system was very efficient. As to the "personal touch," this was maintained not only by the juniors of the staff, but by the seniors also. Mr. Woodall himself often visited these small managers, because he realized to the full the value of this "personal touch;" and everybody felt perfectly free to discuss with him any points that they might have to raise. This was a great thing. With a Chairman who knew the industry right through, and other Directors well qualified to inspect the works, the Managers were put quite at their ease, so that the "personal touch" played a great part. He was glad to hear Mr. Chandler's remarks about service to the consumer—a matter to which he had not referred in the paper, because with these Companies there had been so much other work to attend to. In three cases, however, there had been organized, with successful results, a regular maintenance system under which one fitter was detailed to overhaul all burners and appliances. As to free installatior, he might explain that in the case of several of the undertakings with which he had dealt, there was no free work done prior to the British Gas Light Company taking control. The consumer had to pay for the installation work from the meter. Now the Company gave the whole of this work, and the fittings were furnished free; but an extra charge was made for the supply, which varied in the case of different Companies.

Power from Sewage.—The sludge gas power unit installed at the Saltley works of the Birmingham Tame and Rea District Drainage Board in January last has, according to a report of the Board, attracted widespread attention. The installation of a 400-B.H.P. gas engine and alternator was completed in January last and is the largest power unit in the world utilizing gas formed in the bacterial fermentation of sewage sludge. A smaller engine of 150 B.H.P. has been in constant operation since September, 1927. The sludge gas possesses a high calorific value—625 B.Th.U. per 1000 c.ft. It is a remarkably clean gas, eminently well fitted for generating power in an internal combustion engine. The total annual output of power from the two engines amounts to one and one-eighth million units, and the savings to the Board after making allowance for maintenance and loan charges on the plant and machinery is estimated at £2000 per annum.

MIDLAND JUNIOR GAS ASSOCIATION.

Presidential Address of Mr. A. R. Myhill.

The first meeting of the session of the Midland Junior Gas Association was held at the Council House, Birmingham, on Thursday, Oct. 10. Mr. F. Caudwell (Shrewsbury), the retiring President, occupied the Chair, and at the outset expressed regret that Mr. A. R. Myhill, the President for this year, was unable, owing to illness, to be present.

The Chairman then read Mr. Myhill's Address.

PRESIDENTIAL ADDRESS

Of A. R. Myhill, A.I.C., of the Birmingham Gas Department.

In view of the excellent selection of papers on specific topics which comprises our programme, I have decided that I will refrain from taking up any particular descriptions, and will keep away, as far as possible, from any figures and statistics. Instead, I should like briefly to survey our position as juniors in the gas industry, and to take stock of our status in the scheme of human welfare and civilization. This, in its entirety, would be a very big job, so that I can do no more than attempt to direct your thoughts along certain lines, leaving you, in your turn, to exercise the combined prerogatives of age in dreaming dreams, and of youth in seeing visions.

Ever since the days when Murdoch amused his friends by carrying gas about in bladders, and the scientists of his day were sarcastically inquiring whether it was proposed to utilize the dome of St. Paul's as a gasholder, the industry has travelled along a rough and thorny path, and has not yet come to the end of its troubles. Some of our friends go so far as to tell us that our days are numbered. Cheap electricity, they say, is going to close down all our gas-works, and we, misguided followers of a dying industry, will shortly find ourselves swelling the ranks of the unemployed. All this is so disheartening that it may act as a tonic to our drooping spirits if we turn aside for a moment from these doleful Jeremiahs and look at our prospects in the light of cold truth, divorced from political propaganda and unbiassed by the voice of vested interests.

In spite of all the difficulties which the gas industry has encountered, its growth has been so rapid that it has been a matter of extreme difficulty on the part of those responsible to turn out sufficient gas to meet the public need. To those who say that we are being outstripped by electricity, we may refer the official figures which prove that the output of potential energy by one London Gas Undertaking is greater than that of the whole of the electrical generating stations of the country. Moreover, it has been noticed, not only in England, but in countries abroad, that increases in electrical development are always accompanied by corresponding rises in the consumption of gas. Mr. Thomas Hardie, Chief Engineer to the Gas Light and Coke Company, has pointed out that, while in this country gas consumption has increased by 33 p.ct. in ten years, in America, where far more electricity is used per head of population, the figure has risen to 100 p.ct.

This is all very satisfactory and gratifying to us in the gas industry, but there are signs abroad that we cannot afford to rest on our laurels. Great events are taking place, and mighty schemes are being launched in the application of fuel to the production of light, heat, and other forms of energy. What was the recognized practice of yesterday will be out of date to-morrow, and in these great schemes gas will hold a definite and established place. Before this comes about, however, we shall have considerably to broaden our outlook and enlarge our knowledge. We shall have to face certain factors which never troubled our predecessors. Such factors relate to the employment in industry and in private occupations of forms of energy other than gas.

Co-Operation.

There was a time when competition was supposed to be the greatest stimulus to trade activity. This idea is being very greatly modified. The term "co-operation" is replacing that of "competition." The new generation, wiser than its forefathers, has seen how the resources of nations are squandered by wars and disagreements; has learned how the purses of litigants are drained by litigation; and has realized that a lot of good talent and material can be wasted by the destructive competition of rival services. The reason for this is that, wherever you find pairs of competing industries, whether they be gas and electricity, coal and oil, silk and cellulose, or railways and motor cars, you will always find that there are circumstances where each has certain advantages over the other. It is a certain fact that no one form of energy can claim a monopoly in all its applications. Unfortunately, the mind of the layman is biassed by the inspired propaganda of those who have their own axes to grind, and, worse still, the consumer is often deprived, by legislation or other circumstances, of the facility of choosing the form of energy best adapted for his particular needs. This is a serious matter, as the price and facility of application of heat or potential energy are among the most important controlling factors in the cost of production of the necessities of daily life. These facts are being realized by those who are responsible for supplying this energy, as well as by those who have to use it; and the conclusion is being gradually arrived at that the amalgamation of resources is the only logical solution of the problem.

One Great Fuel Industry.

From the points of view of both generation and consumption, there are indications that the deficiencies of one form of energy can often be supplied by another. On the manufacturing side, we see gas-works producing coke and breeze in excess of their requirements, which products could be used for the production of electricity or the distillation of liquid fuel. Furthermore, there are electrical undertakings which make oil and tar which could be used either directly as fuels, or indirectly as gas-making materials. In such cases, the pooling of resources would result in a great reduction in costs. In short, the time is not so far distant when the supply of gas and electricity will be run as sections of one great industry, comprising the output of all forms of energy, not excepting that provided by solid and liquid fuels. It will be the aim of the management of such an industry to combine the generation and supply of the various forms of energy—I prefer to refer to it as energy, rather than as fuel, since the latter is a restricted term—so that gaseous, liquid, solid, and electrical forms may be made to fit into their

THE PRESIDENT,

A. R. Myhill, of Birmingham.

Mr. Myhill was educated at the Birmingham Municipal Technical Day School, and joined the staff of the Birmingham Gas Department as a Chemist in 1909. He has been engaged in the same service until the present time, with the exception of a short period in 1920, when he was in charge of the Analytical Laboratories of the British Dyestuffs Corporation (Acids Department), at Huddersfield. He has had experience of all the branches of the Birmingham Gas Department Chemical Section, commencing as a Shift Chemist on the large coal testing works, and being, in turn, Works Chemist at each of the five works of the Department. For about twelve years he was engaged as a Senior Chemist in the Birmingham Special Laboratory, which is a section of the Central Laboratory devoted entirely to Research Work and investigations, apart from the ordinary control and sales tests. Mr. Myhill was elected an Associate of the Institute of Chemistry in 1918. In addition to his duties as Chemist, he contributed many articles on scientific subjects to the Technical Press, and was at one time on the staff of Abstractors for the Society of Chemical Industry. Previous to his election as Junior Vice-President of the Midland Junior Gas Association (leading to Presidency), he was the Hon. Treasurer. He is a lecturer on Gas Engineering at the Birmingham Central Technical College.

rightful positions in a scheme which has for its object their most economic utilization. This economy will be effected by taking the greatest advantage not only of the individual virtues of the separate components, but of their interdependence.

The question of national distribution will have to be settled on an economic basis, and amalgamation will take place not only of the different sections, but of the smaller units of the same section. In other words, the days of small undertakings, whether gas or electric, are rapidly coming to an end. Those responsible for selling the energy and the appliances for its consumption will be faced with the duty of seeing that the consumer is getting the utmost benefit from their use. There will be created a service of unprejudiced salesmen, capable of advocating the best type of apparatus and the most suitable fuel for a particular job. It is a difficult thing at present to get such unbiassed service, owing to the inability of the salesman to advocate the use of a commodity which lies solely within the province of his competitor.

Energy Salesmen of the Future.

Since the whole basis of such an amalgamation is the interdependence of the constituent sections, it is obvious that the men in charge of the separate departments will have to possess something more than a familiarity with their own branch; they will have to acquire an even wider outlook than they have at present. They will have to know something of their allies' territories, so as to appreciate the bearing which their own activities will have upon those of the other sections, and, conversely, how the practice of those other sections will influence their own.

Before such an amalgamation can take place, however, there will have to be new legislation. There is on foot, as all of you know, a State-aided scheme for the linking up of electrical generating stations, and the supply of standardized electric current throughout the whole country. This is hoped greatly to cheapen the price of electricity, and I have no doubt that, in time, it will do so, and the nation will benefit accordingly. In some respects, however, there appears to be a short-sightedness of policy, and a lack of realization of what the gas industry can do to assist in the provision of cheap lighting, heating, and power, and even in the provision of electricity itself.

There are certain legal restrictions placed upon our activities as an industry, the details of which are far too intricate to go into, in the course of such a short address as this, which are prejudicial to the best interests; and I feel confident in predicting that a time will come (and that not far distant) when the powers that be will come to the realization that the removal of these restrictions is imperative.

You may say that we in the Midland Junior Gas Association are members of an organization which is out to study gas, to make gas, to sell gas, and to talk gas. My reply is that these things are means, and not ends. Our end and aim is the service of the community, and, if the means we adopt do not serve the great public in the manner which it needs, then that same public will soon find ways of serving itself, to our detriment.

Consequently, it behoves us to take stock of ourselves, so that we may be certain of progressing in the right direction. In our search after truth, we are bound to realize our defects, and, in the same search, to see what are our outstanding virtues. It is up to us to cure the first—if curable—and to cultivate the second. It is of no use turning a blind eye on our rivals (or, as they must eventually become, our allies); the condemnation of a rival, simply and solely because of its rivalry, and not on account of its demerits, cannot result in any ultimate progress. We have no moral right to condemn intrinsic goodness because it happens to proceed from a rival source. Moreover, such a practice is useless in the final issue, since the forces of evolution will always right the wrong. Consequently, the frank and open facing of the situation becomes a necessity.

The Lighting Load.

I think there is still a great future for domestic lighting by gas, but only if we pay serious attention to the following points:

(1) Convenience, including really reliable distant control.
(2) Cleanliness, both of fittings and surroundings.
(3) Lack of need for specialized knowledge on the part of the consumer, even of the most elementary kind.

The reason why public street lighting by gas can be made so successful is that the personal element is largely eliminated. The control of outside lamps is usually in the hands of technically trained persons; and, under such control, gas is well able to hold its own, and in many cases to demonstrate its superiority over electricity. One has only to see the public lighting in Victoria Square, Birmingham, or the Parade, Leamington, for instance, to realize that, as regards doing its job properly, gas has nothing to fear from electrical competition.

The sulphur-removal problem provides ample scope for the skill and ingenuity of the gas-works chemists of the future. I venture to suggest that the installation on our works of processes for the complete removal of sulphur from gas will be a necessary and established practice of the future.

Sulphuretted Hydrogen Removal.

Closely allied to this subject is that of the removal of sulphuretted hydrogen. The law requires us to remove this constituent entirely, but we go about the job in a very awkward and clumsy manner. The huge vessels we employ in the purifier house, and the large area of ground space which they occupy, are out of all proportion to that taken up by other portions of the works plant. There is an excessively large quantity of material to be handled, with consequent heavy labour charges and storage difficulties. The process is intermittent and, as regards its expected efficiency, is one of the most uncertain in the whole course of gas manufacture, owing to the difficulty of standardizing the composition and physical state of the material and the gas. There are liquid purification processes at work, but they have not yet provided a satisfactory solution to the problem, at least in this country. The sodium carbonate process is working well in America, but it possesses the great disadvantage that the sulphur of the gas has to be eventually discharged into the air either as H_2S or SO_2—a practice which would never be tolerated in this country. Here is some more work for our research men. There seems no reason to suppose that the process is incapable of modification so as to make it usable in Great Britain. Its introduction, besides serving as a means of economically removing sulphuretted hydrogen, would result in the simultaneous extraction of cyanogen and the consequent lessening of corrosion troubles on the works and in the area of supply.

Looking again into the future, we may see, as one of the great hopes and expectations of the gas industry, the development of methods of production and marketing of coke. Incidentally, we have here another case where the greatest benefit will be derived by amalgamation of gas with other energy producing systems. It seems almost inconceivable that the product which we turn out in larger quantities than any other, has been neglected to such an extent. The potentialities of the coke market are tremendous.

With the growth of the use of gas, there has followed a proportionate increase in the production of coke, since the two products must be made simultaneously. Unfortunately, however, the demand for this coke has not always been great enough to preserve a satisfactory balance between the two commodities. There are two ways in which a product may be sold. One way is to depend on trade fluctuations and localized conditions, and the other is deliberately to cultivate a steady demand and absorption which will not be liable to fluctuation by trade booms or depressions.

The gas industry in the past has been too satisfied to sell its coke by the first method, with the result that little attempt has been made, until recent years, to improve the quality of the material. As a consequence, some very poor stuff has often been turned out and sold to the domestic consumer, with the result that his mind has, in a large measure, been prejudiced against what he regards as almost a waste product.

That this should be so is deplorable. Properly made, coke is superior to coal in many ways for burning in domestic grates, and the gas manager of the future will have to give as much attention to the manufacture of coke as to the turning out of suitable gas. There is no excuse whatever for producing a poor or unmarketable coke.

Dr. E. W. Smith has very pithily described the properties of the ideal domestic coke by saying that it should be as dense as coke oven coke, and as porous as charcoal. In addition, its ash content should be below 5 p.ct. It should be graded to the right size for the particular job it has to perform, and should not be sold as a mixture of large and small pieces.

The manufacture of such a coke as an economic accompaniment to gas production is possible by a proper selection of coals and by their proper treatment not only during carbonization, but, if necessary, prior to it. The preparation of coal, its washing, its pulverization, the blending of two or more types for carbonization together, the briquetting of powdered coke—all these things must be studied. They are mentioned as being among the things with which we shall have to concern ourselves in the future. We have been used to selecting coals with a view to their gas-making capabilities. When the public becomes educated in matters pertaining to coal conservation and smoke abatement, these coals will have to pass two types of test. They will need to be not only good gas coals, but good coking coals; and if one type of coal has a good gas yield but is a bad coking coal, we shall have to consider whether it can be improved by suitable blending.

Education Scheme.

The Institution of Gas Engineers have inaugurated an Education Scheme, and the effects of such a scheme, not only on the gas industry but on trade of all kinds, will be far-reaching, since it will serve as one of the most potent factors in providing a supply of young men who will be well trained for their job and whose apprenticeship and probationary years have been spent under the guidance not only of their own chiefs of departments, but of the heads of the industry. In the booklet which explains the objects and methods of the Scheme

you will find, clearly and concisely set out, a plan of study for the student of Gas Engineering or Gas Supply. A perusal of this little book is an education in itself. There is far more value in knowing what to study than is sometimes realized, and I think that the thanks of every junior in the gas industry are due to those men who were responsible for drafting, in such a concise form, a scheme of study suitable for those wishing to become proficient in the subjects of Gas Engineering and Gas Supply.

Regarding, in particular, the ancillary subjects, I fear there is a growing tendency at the present day to try to learn a subject from the end rather than from the beginning. To understand one's job thoroughly, it is absolutely essential to master the elementary "pure" subjects on which the "practical" ones are based. The theory of mechanics, physics, and chemistry is the basis of the practice of gas manufacture and supply, and the study of these three "pure" subjects should not be shirked or skipped if a proper grasp of the main subject is to be obtained. At the same time a balance must be preserved by supplementing theoretical knowledge with practical training.

In addition to the study of one's subject from classes and text-books, and apart from the acquisition of experience in connection with one's daily work, there is another method of adding to one's knowledge and broadening one's outlook, and that is by intelligently taking part, whenever possible, in gatherings of men where interchange of opinion or the discussion of individual experiences is encouraged. Let us not be too much afraid of showing our ignorance. We are all amazingly ignorant on most subjects, and, personally, I always view the over-confident man with suspicion. On the other hand, let us be generous in imparting the results of our experience to others. The occasions when it is really necessary to withhold information are very rare, and I am quite sure in my own mind that the way of progress lies in giving away, as well as receiving, as much information as possible. In this way, free and frank interchange of opinion is encouraged, and the individual benefits from the experience of the community.

Vote of Thanks.

Mr. W. MacNaughton, Senior Vice-President, moved a vote of thanks to Mr. Myhill for his address. It would have the effect of stimulating the members to take an increased interest in the work of the Association. They all regretted the cause of Mr. Myhill's absence, and their hope was for his speedy recovery.

Mr. W. L. S. Spinks, a Junior Vice-President, seconded the vote of thanks. It seemed clear, as the President had pointed out, that the future of the gas industry and of those who were engaged in it depended upon the extent to which they took advantage of opportunities as they arose.

The resolution was unanimously adopted, and Mr. H. C. Wills, the Hon. Secretary, was instructed to send a letter of sympathy and best wishes to Mr. Myhill.

In accordance with practice there was no discussion of the address.

SCOTTISH JUNIOR GAS ASSOCIATION (EASTERN DISTRICT).

Opening Meeting of Session.

The Opening Meeting of the Association took place in the Gainsborough Hall, Edinburgh, on the afternoon of Saturday, Oct. 5. About 35 members were present, presided over by Mr. R. J. Gavin, the retiring President.

The Chairman thanked the members for the support he had received during his term of office. In introducing the new President, Mr. John Scobie, of Dunfermline, he mentioned that the name Scobie had been very well known in Eastern Junior affairs for a number of years, and it gave him great pleasure in calling him to the Chair.

Mr. John Scobie, replying, said he appreciated very much the honour the members had conferred upon him in electing him President, and trusted the members would support him so that they would have a successful session. The Junior Associations, being "feeders" to the Institution of Gas Engineers, would in future carry a further responsibility, owing to the latter now being a Chartered Institution, and it was his earnest endeavour to keep their Association up to the standard required.

His first duty on their behalf was to present to Mr. Gavin a memento of his year of office. Mr. Gavin had upheld the dignity of the position, and they would agree his year of office had been a very successful one. Papers given during the session had been of a high standard; the meetings well attended, especially the 25th anniversary celebrations, this being in his opinion the longest meeting ever held; and this he had no doubt was in a large measure due to the able guidance of Mr. Gavin.

Mr. Gavin was then presented with a chime clock with the following inscription on it, as a memento of his year as President: "Presented to R. J. Gavin, Esq., President of the Scottish Junior Gas Association, Eastern District Semi-Jubilee Session, 1928-29."

The President, having taken over the Chair of the Association, thanked the members for the splendid attendance, and after referring to the syllabus which the Council had been successful in arranging, expressed the wish that the members would attend in a like manner all meetings and visits. He then informed the meeting that a very kind invitation had been received from Mr. Harry H. Gracie, Engineer and Manager of the Edinburgh Gas Department, to visit and inspect the waterless holder in course of construction at the Granton Works, and also the new sulphate of ammonia plant and "Connersville" meters, on Saturday afternoon, Nov. 16, along with the Scottish Western Juniors. He said the Council had gladly accepted the invitation, and Mr. Gracie was thanked for his thoughtfulness towards the Juniors.

Technical books were then presented to the paperette prize winners during session 1928-29 as follows:

(1) Mr. R. Air—"Reverse System of Pressure Wave Control."
(2) Mr. F. B. Waller—"Some Notes on Coal."
(3) Mr. A. C. Rea—"Some Gas-Works Gauges and Recorders."

The President then informed the meeting that Mr. A. McG. Clark, Engineer and Manager of Port Glasgow, an ex-President, had kindly offered prizes for the best paperettes read during the 1929-30 session to the value of: 1st, £2 2s.; 2nd, £1 1s.; and the Council had added a third to the value of 15s. He took the opportunity of thanking Mr. Clark for his kindness, expressing the wish that a large number of members would come forward in competition.

THE PRESIDENT.

John Scobie, of Dunfermline.

Mr. Scobie was educated at the Dunfermline High School, the Lauder Technical School, Dunfermline, and the Heriot-Watt College, Edinburgh. He commenced work with the Dunfermline Gas Department in 1913, serving in turn in the following departments: Distribution, Works (Fitting Shop and Horizontal and Vertical Retorts), Accountant's, and Engineer's. At present he holds the position of Technical Assistant. Mr. Scobie, who was Hon. Secretary and Treasurer of the Scottish Junior Gas Association (Eastern District) in 1925-26, is an Associate Member of the Institution of Gas Engineers. During the war he had three years' active service with the Cameron Highlanders, serving in Salonica, Russia, and Turkey.

After receiving a Report from Council with reference to the

Scottish Branch of the Smoke Abatement League, it was decided, on a vote, to apply for membership.

Mr. John Scobie then proceeded to deliver the following

PRESIDENTIAL ADDRESS.

In considering a subject for my address, I have decided, as a visit to Dunfermline Works is on the syllabus this session, to put before you details of the various alterations and extensions carried out during the remodelling, improving, and conversion of a 157-million to a 360-million undertaking.

Carbonizing Plant.

When Dunfermline made 157 millions, the system of carbonization consisted of two benches, back to back, each of six beds of eight horizontal retorts, with mechanical stoker, discharging of retorts being done by hand.

The demand for gas being on the increase, vertical retorts were installed. These are of the Woodall-Duckham type, and consist of twenty 5-ton fireclay retorts, the contract including the provision of wagon-tipping plant, coal breaker, coal and coke conveyor, and electrical generating plant. After being in operation for a period, and owing to a still greater demand for gas, a further addition was necessary, this consisting of eight silica retorts and leaving space for a further addition of twelve retorts. The latter settings being placed parallel with the former, and the clinker stage now being mutual to both settings, necessitated the demolition of a hydraulic hoist and the roof and one of the walls of the retort house.

After the erection of the new settings, the wall was rebuilt, the roof replaced so as to cover both old and new settings, and an electric hoist installed. Between this new retort house wall and an adjoining coal store, there is a space measuring 88 ft. by 28 ft. by 32 ft. high, and this space has been adapted for coke storage. Belt conveyors, fed from the retort house "G. B." conveyor, were installed, and these deliver the coke at any desired point in this yard, which is laid with concrete, facilitating the lifting of coke and keeping it free from foreign material. Coke is lifted from this yard by means of bogies run in tunnels underneath, a method that has been found to be both economical and speedy.

I do not intend going into details regarding our experience in the working of these retorts, as you have already had a paper on this subject.

Coal Storage.

After the erection of vertical retorts, owing to the old retort house being in proximity to the existing coal store, and connected by tunnels to the hoists and railway receiving hoppers, a favourable opportunity arose for increasing the coal storage capacity by making use of the old retort house.

Underneath this house were two tunnels, formerly used for cleaning the producers of the horizontal retorts, and these were adapted for use in lifting coal from the new store. Three cross walls were built so as to form four coal compartments, and the cross section of the concrete floor was hopper shaped, like the letter W, the tunnels running underneath the lower portions. Skips are filled from openings in the roofs of the tunnels, and the whole arrangement enables coal to be lifted from stock with very little trimming, and at low cost. In the centre of this store and running its whole length was placed a gangway resting on the division walls, by means of which coal, after being loaded into skips from a railway hopper and elevated by means of a hydraulic hoist, can be emptied into any division of the coal store. The capacity of the new store is 3000 tons.

Purification.

The purification system previously consisted of a Dempster tower scrubber, a Walker's purifying machine, and a set of four water-lute purifiers 22 ft. sq. by 4 ft. 10 in. deep, with centre valve and hurdle grids.

The former have now been replaced by a 2-million per diem Livesey washer, and a 2-million per diem Holmes rotary scrubber. The dry purifiers at this period were not only too small, but required considerable repair, and to take their place a new house was built, into which was placed a set of four purifiers 35 ft. sq. by 7 ft. deep. These are of the dry lute type, above ground, operated by means of a Weck's valve and having Spencer's patent grids. When installed, these were fitted for upward flow, but have now been altered by ourselves to downward flow. I would mention that we have of late, when refilling purifiers, put in oxide in a dry state (under 15 p.ct. H_2O) instead of adding moisture, and this has considerably reduced back pressure, and, at the same time, proved just as efficient as the previous system. For the rapid handling of oxide, two hoists were installed, connected to a steam winch in such a way that one hoist is ascending with full barrow loads while the other is descending with empties. At a later date, in order to dispense with storing oxide in the yard, which you will agree is rather unsightly, and at the same time assist materially the process of emptying the purifiers, a concrete floor was laid mid-way between the bottom of the purifiers and the ground level. By this means it is now possible to empty oxide from the purifiers on to this central floor, where it is transported to an oxide breaker situated immediately underneath, and, after being broken, finally falls to the ground floor level, where it is spread for revivification.

Engine House.

Exhausters and compressors have also been replaced, and, in order to make room for the new and larger type, the position of the various engines and pipes had to be altered. There were formerly three exhausters, one of 100,000 c.ft. per hour; but the other two combined were not capable of dealing with our lightest load, and were therefore replaced by one having a capacity of 100,000 c.ft. per hour.

The compressing plant consisted of three small rotary compressors. In re-arranging these, a 50,000 c.ft. per hour against 20 lbs. per sq. in. pressure "Duplex" reciprocating compressor was installed, this being used to supply the various outlying districts. Provision was made for connecting another similar to the above, and two of the rotary compressors were left in position, the larger of which is used to supply the city requirements and the village of Townhill.

Boilers.

Boilers consisted of two Cornish type 18 ft. long by 5 ft. 6 in., having a maximum working pressure of 60 lbs. These were not capable of dealing with the required load, and as we now required a pressure of 100 lbs., a Lancashire boiler was installed. This is 30 ft. by 9 ft., having a working pressure of 120 lbs., and has since been fitted with a soot blower.

After the erection of the new carbonizing plant, and in order to make use of waste heat from it, a waste-heat boiler was installed. By fitting a thermofeed control and high and low water alarm, the boilerman in charge of the Lancashire boiler is now able to take charge of this one also. The fan is steam driven, the speed being altered to suit requirements, and the exhaust steam used to pre-heat the feed water, the average temperature of which is in the region of 210° Fahr. In order to conserve as much heat as possible, the main flue and the flue leading to the boiler have been well insulated. An important point in connection with a waste-heat boiler, in addition to the steam generated, is the fact that, by means of the fan, you have absolute control of the draught on the settings, irrespective of the weather.

The two Cornish boilers which were kept as a stand-by were next dealt with. After considering the initial cost along with the provision of the necessary chimney stack, it was decided to instal a Cochrane multitubular boiler with turbine furnace. There is room in this boiler house for three boilers of this type in line, the present one being placed in the centre, and to provide for these further additions in the future, the necessary drain pipes were placed in position previous to laying the floor with concrete. I would impress on the younger members present the necessity, not only for ease in fitting up but also in saving expense, of taking accurate measurements of pipes, &c., when making alterations, and, as an example, would take the above case, where six steam pipes were to be connected up, none of which were in alignment or on the same level. These were measured for pipes, expansion bends, valves, &c., and provision made for connecting up the other two boilers at a later date, and all of these were placed in position, without any alteration whatever being made to them.

Exhaust Steam.

In order to recover heat from this source, exhaust steam connections have now been made to what may be termed an exhaust steam main, this leading to and being used at the boiler feed water heaters, any surplus being discharged through exhaust heads.

Gas Storage.

The older part of this plant consists of: No. 1 holder, having a capacity of 214,000 c.ft.; and No. 2 holder, having a capacity of 327,000 c.ft.; and this total of 541,000 c.ft. was equal to less than twelve hours' storage. This was not satisfactory, and it also necessitated the letting down of retorts usually at week ends, and starting them up again early in the week. This practice was not only harmful to the retorts, but also accounted for an unnecessary waste of fuel due to our having to keep extra retorts under fire to meet emergencies. In consequence, it was decided to erect a 1¼-million spiral-guided holder in steel tank, and, in selecting a position for this, benefit was derived from the foresight of those previously in charge of the works, as there were four acres of ground available for extensions. This holder is erected entirely above ground, and it may be interesting to note that, owing to the satisfactory nature of the soil, only 18 in. of concrete foundation was necessary. The site of this holder is some distance from the valves controlling the other holders, and, in order to make it as convenient as possible, the valves were fixed close to those operating No. 2 holder, and were inserted by means of under pressure connections.

The inlet to the compressing plant at this period was taken from the common outlet of No. 2 and No. 3 holders, but, owing to the suction having a pulsating effect on the flow of gas to the town's governors, it was decided to alter these connections. On the outlet of No. 1 holder, and before reaching the outlet

valve, a connection was made to the inlet to compressors, and this holder is now used as storage for compressors only, being filled periodically from either No. 2 or No. 3 holders.

The use of a film of oil instead of paint has been tried on this No. 1 holder, and has been completely successful. One point I would emphasize is that ample provision must be made for the overflow of water from the lutes, so as to prevent the loss of oil, as it is surprising the amount of water discharged during cupping, in wet weather, or from both of these causes at one time.

Tar Plant.

In 1925, a 20-ton per day tar plant on the "T.I.C." system was installed, and, in order to have sufficient storage for the make of tar during the winter months, a reinforced concrete storage tank was erected. This is 60 ft. by 60 ft. by 11 ft. high, divided into five separate tanks, the capacity of these being: One of 150,000 gallons, one of 50,000 gallons, and three of 10,000 gallons each. This is built so that the bottom is about level with the ground level of the lower part of the works, while the top is level with the higher level of the works. Into each tank is placed a series of steam pipes, by means of which the tar, before pumping, may be made more fluid. The pumps, which are of the reversible type, are placed in a covered tunnel alongside the bottom of the tanks, and this position makes their work much easier. Being of the reversible type, it is possible, after pumping tar, to reverse the pump, and empty the outlet pipe entirely, thereby making certain that trouble will not be encountered with thick tar the next time the pumps are used.

Oils are now stored in the four discarded purifiers previously referred to, and, as these are on a higher level than the railway, it is now possible to fill tank wagons by gravitation. A bitumen plant has also been installed, the heating of which is done by waste gases from the tar still, the tar and bitumen being mixed by means of compressed air.

Owing to the demand for various grades and mixtures, and in order to have a sufficient quantity ready for sale, it was found necessary to increase the storage accommodation for prepared tars, and by having the internal flues cut out and the ends sealed up, use was made of the disused Cornish boilers for this purpose. The storage accommodation for prepared tars and bitumen mixtures consists of four tanks of a total capacity of fully 7000 gallons, one being used for No. 2 tar, and the others for various bitumen mixtures, according to customers' requirements. When preparing mixtures containing a high proportion of bitumen, the output of the plant was much reduced, as bitumen was melted at a much lower rate than that at which tar was distilled, and it was therefore necessary to speed up the melting of bitumen. To do this, an auxiliary bitumen heating tank was installed, in which the bitumen is made sufficiently fluid to run into the bitumen melting pot, thus increasing the throughput. The heating of this auxiliary tank is by means of waste gases from the still and bitumen melting pot, and a series of steam pipes which may be used if required. By this arrangement it has been found possible to melt bitumen at the same rate as tar is distilled, thus materially increasing the throughput of the plant.

Distribution.

Our low-pressure area extends to a radius of two miles, and, in order to keep mains and services up-to-date, an extensive system of examination has been in force during the last few years. When there is to be an alteration to a road or the roadway relaid, we take the opportunity of examining and renewing mains if necessary, also of renewing all services along that part to be relaid before such work commences. Unions on services are, as far as possible, placed at a distance of 2 ft. from the consumers' property, and, in order that the union may be readily accessible, a concrete slab 2 ft. square is inserted in the footpath. All service pipes are painted with prepared tar, then wrapped with hessian cloth, and again tarred. The following, though not including a large number of isolated services renewed, will assist in forming an idea of the extent of such examinations, and the work of this department.

January, 1925, to May, 1929.

	Miles.
New mains laid	4½
Mains renewed and enlarged	1¼
Mains examined and found to be in good order and of sufficient size (joints caulked)	2¼
Services on both sides of streets renewed along	3¼ of roadway

High-Pressure System.

We have, during the period referred to in this address, made considerable extensions to our high-pressure system, by means of which we now supply over 84 million c.ft. per annum. Certain details have already been given of this system, but in order that you may grasp clearly its lay out, and owing to this now being a very prominent system of distribution, I will explain each area briefly.

(1) *Townhill Area.*

This village, which stands at a high level, was supplied by means of a 4-in. low-pressure main from the city area, and at times of heavy load the pressure was insufficient, while at times of low demand the pressure was too high. In order to overcome this, the city 6-in. high-pressure main was extended by a 4-in. steel main to this area, and is now used in conjunction with a high-pressure governor. The low-pressure main before entering the village was cut and connected to a low-pressure governor, the outlet of both governors connecting to a common low-pressure pipe supplying the village, the system of working being as follows:

During the lighter load period, when the high-pressure supply is off at the works, the high-pressure governor goes out of action, and at the same time the low-pressure one comes into action. During times of heavy demand, pressure on the high-pressure system is put on from the works, thus bringing the high-pressure governor into action and at the same time (owing to its higher outlet pressure) cutting out entirely the supply from the low-pressure governor.

(2) *Rosyth and Inverkeithing Area.*

The Rosyth area is supplied by means of a 5-in. high-pressure steel main three miles long connected to a 6-in. high-pressure governor, the outlet of which connects to the low-pressure system. This area was built during the war for dockyard employees, and the main was intended to be of a temporary nature only. Higher pressures now being used on the works, the main is of sufficient size, but, owing to the alteration of road levels, it was at certain points showing above ground, the wrapping becoming loose, and in certain places the pipe was entirely exposed. To rectify this, the main was lowered so as to have at least 1 ft. 8 in. cover. This was carried out without shutting off the supply, the procedure being as follows:

The roadway where the main required to be lowered is very hilly, and during the operations a stretch was opened and bars placed across the trench. Pieces of rope were then at intervals tied around the pipe and over the bars, and by twisting this rope the pipe was lifted about 3 in., the weight being carried by the bars, thereby leaving sufficient space for further excavation. When sufficient soil had been taken out, the ropes along the stretch were untwisted, and the main lowered into position. Heavier cuts were made on the crest of the hills in order to make up for the "draw" in the lower parts.

This main has also been extended with a 4-in. steel main for a distance of 1¼ miles to supply gas "in bulk" to Inverkeithing, pressure being governed by means of a 4-in. high-pressure governor, the outlet of which is connected to the station meter, the gas then going forward to the holder. It may be of interest if I mention that, since taking a supply from the Dunfermline works, the price of gas in this area has been considerably reduced and the consumption increased.

(3) *Limekilns and Charlestown Area.*

These villages are three and four miles respectively from the works, the supply being my means of a 4-in. main and high-pressure governor.

After being in use for a considerable period, trouble arose owing to shortage of pressure at the extreme end of this district. In such a case the outlet pressure of the governor could have been increased, but this would have given too high a pressure to consumers in the vicinity of the governor. In order to overcome this the outlet from the governor was set at 10 in. and low-pressure governors installed at certain points, each feeding a small area at 4 in. pressure.

(4) *Culross and Kincardine Area.*

This district consists of seven villages, the last of which is supplied by a bulk supply from the local undertaking. The first seven miles of this high-pressure main supplies six villages, pressure to consumers on the route being governed by means of house governors. Opportunity is taken, wherever possible, to make use of one governor to supply a few consumers,. connections on the low-pressure side being left wherever there is a possibility of another service being required. An extension was made to supply Kincardine works, and a supply was given to farmhouses, &c., on the route. This extension is five miles long, the main being of steel and having welded joints.

Recording Position of Mains, Services, and Governors.

In order to record the position of low-pressure mains and services, a series of survey maps are used, on which are recorded the positions of all mains when laid or renewed, also services connected thereto. To find the position of any main or service, a key plan is used in conjunction with sets of survey maps. From this key plan, which is divided into numbered squares (each square representing one survey map), the position of the street is found, the number of the survey map noted, and an indication given of the set where the required map is to be found. Special details, such as branches, pipes at junction of streets, &c., are recorded on a large scale in a loose leaf book, which is lettered alphabetically, and when such details are entered there, they are also marked, "Detail at . . ." on the map indicating that under that letter in the detail book may be found a sketch giving measurements of pipes, &c., at that point.

In the outlying districts supplied under high pressure, where 290 governors are in use, the system of recording is as follows: Loose-leaf books are used, and in each book, preceding the sheets referring to each village, is a map on which is marked against every consumer's house the number of the governor supplying same, all houses supplied being painted red on the map. In the event of a complaint or another service being required next to one in use, all that is necessary is to look at the plan and find the governor number of the house concerned; then turn over to that number where all details of this governor and service pipes may be found.

The positions of all high-pressure mains are also recorded, and slabs indicating drip boxes, or special reference points, put into the verge beside the main. The length of each pipe is also noted, and by this method we have, by experience, found it possible without trouble to locate any joint.

In conclusion, I would take this opportunity of thanking my Chief, Mr. James Campbell, for permission to lay before you the contents of this address, and I trust there may be something of interest to all of you, no matter in which sphere you are interested.

Discussion.

Mr. R. J. Gavin (Kirkcaldy), after thanking Mr. Scobie for his address, inquired if the reason for putting oxide in with under 15 p.ct. H_2O was to increase the efficiency or to remedy clogging; also if a film of oil instead of paint in the gasholder had been in use for a long period, and if there was provision made in order to keep the oil equally distributed. Did Mr. Scobie consider the wrapping with hessian cloth and painting of service pipes successful, and did he ever find trouble due to internal corrosion?

Mr. Air (Crossgates) asked if, during times of heavy demand, trouble was not experienced with low-pressure governor at Townhill; also what the governor outlet pressure was at Kincardine; and if with the welded steel main he had ever experienced trouble with broken joints.

Mr. Duncan (Perth) inquired the type of waste-heat boiler in use, and the kind of insulation used in connection with it; also the type of high-pressure stopcocks used in the outlying areas.

Mr. Richmond (Penicuik) said he preferred, if at all possible, to enlarge the low-pressure meter instead of making use of a high-pressure supply.

Mr. Ford (Inverness) wished to know the heights between the bottom of the purifiers and the new concrete floor; also between the concrete floor and the ground level; and also if there were special advantages to be derived from the downward flow in purifiers. Regarding the waste-heat boiler, was it a reciprocating or turbine engine, and what was the average speed when in use? What kind of tar was used for painting services, and was it a special oil that was used in the holders; and was 210° Fahr. a regular temperature for the feed water to the waste-heat boiler?

Mr. C. D. Blackhall (Edinburgh) considered the system of lowering the high-pressure main in Rosyth without shutting off the supply very good.

The Author's Replies.

Mr. Scobie, in thanking the members for the very kind way in which they had received his address, said he had the paper prepared giving all details, &c. However, after further consideration, he decided to keep these out in order to make it as short as possible. In answer to the questions raised, trouble was experienced with back pressure in the purifiers, this being over 30 in. at the outlet from the exhauster, and at times seals were blown, but it did not now reach 30 in. pressure. Purifiers now run approximately 50 days, whereas previously it was sometimes necessary to change the sequence after 7 or 10 days. The film of oil had been in use for about 18 months, and after being in use for a period, certain parts where the paint could not have been in proper contact with the metal formed into a blister, finally falling off. The oil then got proper contact with the metal. When using oil instead of paint, it was necessary to insert special plates or baffles at certain points to keep the oil from finding its way to one side, this being caused by high winds, &c. The wrapping and painting of service pipes had been found to be entirely successful. A service treated in this manner gave no trouble. A few instances of internal corrosion had been found, but these are extremely rare. The low-pressure governor at Townhill had given no trouble, the high-pressure governor was set to give an outlet pressure of 4 in., this being ½ in. higher than that which the low-pressure governor is set to give. The outlet pressure at the Kincardine governor was 4 in. High-pressure steel mains with welded joints had proved successful, and should a stretch of low-pressure main be laid, this would certainly be the type of joint used. No trouble with broken joints with this type of main had been experienced. The type of waste-heat boiler in use was that manufactured by Ruston & Hornsby, the flue leading to the boiler being insulated by means of slag wool and molar bricks. Mueller cocks were used with the high-pressure service regulators in the outlying districts.

The height between the bottom of the purifiers and the concrete floor was 7 ft. 6 in., and between the concrete floor and the ground level 7 ft. 6 in.

There were special advantages in the downward floor, included in these being the fact that one had greater surface contact. With upward flow the surface available was that between the spars of the grids, whereas in the downward flow the gas on entering the purifiers came in contact with the whole body. The top portion also became "caked" first, and, of course, it was much easier to slacken or replace this. The engine used in conjunction with the waste-heat boilers was of the reciprocating type, the speed of which was regulated between 350 and 400 according to requirements.

Tar used on the services was from the tar plant, being distilled at a temperature round about 220° C.

Special gasholder oil was used in connection with the holder. Regarding the temperature of the feed water to the waste-heat boiler, he had never seen this below 200° Fahr., but it was usually about 210° Fahr.

A hearty vote of thanks was accorded to the President for his address, after which the members adjourned for tea.

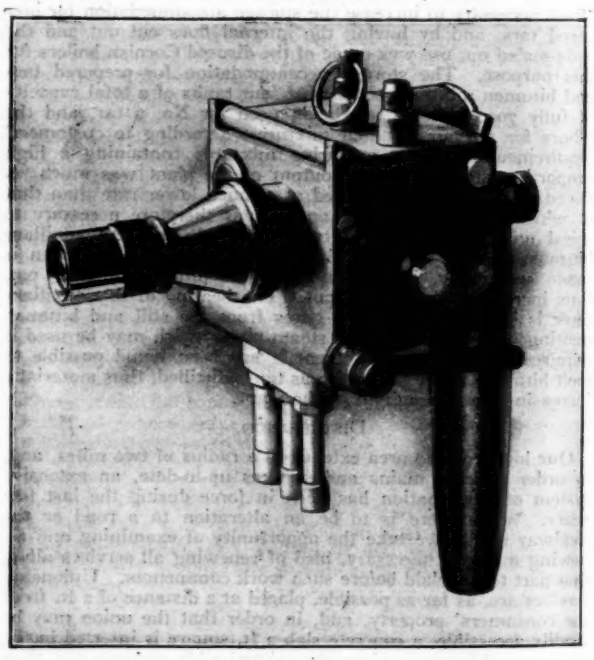
DEVELOPMENT OF THE METALLIZATION PROCESS.

Latest Improved Metal Spraying Pistol.

It is possible by means of this very simple apparatus, recently introduced by Metals Coating Co., Ltd., of Birchin Lane, E.C., to apply an exceptionally durable coating of any commercial metal upon any other metallic or non-metallic surface. Metallic coatings may also be applied to non-metallic materials, such as wood, stone, brick, glass, porcelain, concrete, leather, and fabrics. The thickness of the coating may be varied, according to the requirements, from 0·001 in. upwards.

The metal to be deposited is used in the form of ordinary commercial wire, and any metal that can be drawn into wire can be used. The wire enters the tool at the rear, is fed automatically from a reel through the nozzle and into contact with an oxy-acetylene flame which melts the wire, and in combination with compressed air blows the atomized metal against the surface being coated at a velocity of about 3000 ft. per second. The metal, as it impinges against the surface at this high velocity, solidifies, and practically becomes an integral part of the surface.

This metal-spraying tool weighs only 3½ lbs., and is manipulated by hand for most work. In many cases, particularly in coating large structural members, &c., the tool must be taken to the work, and this may readily be done, whether in the shop or out in the open. The interior surfaces of tubes, even though small and of considerable length, may be coated readily by using a special attachment to the "Metalayer" tool.

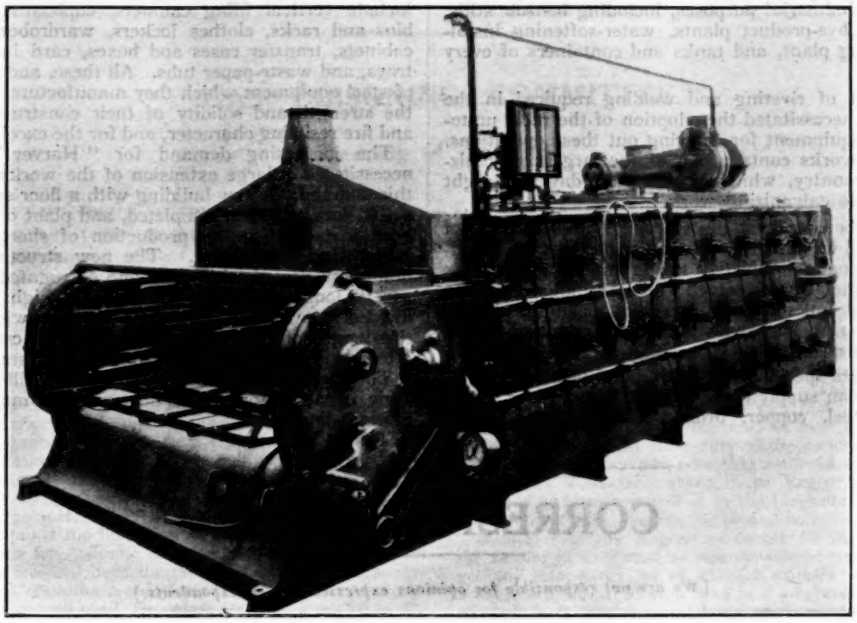


When comparatively small pieces are to be coated in bulk, a mass coating machine is used in conjunction with the "Metalayer." This machine is somewhat like a tumbling barrel which turns the mass of parts over and over, continually presenting new surfaces to the "Metalayer."

It is impracticable to give even a partial list of the applications of this process, since it may be applied in many branches of the mechanical and electrical industries, as well as in various other industries. The coating of iron and steel with zinc by this metal spraying process is a cheap and efficient rust prevention. A sprayed zinc coating 0·004 in. in thickness gives a protection equivalent to the best hot dip galvanizing, and, of course, has other advantages in that work of any size can be treated *in situ*, if necessary, while there is no possibility of distortion of intricate articles.

Aluminizing is a patented process for the protection of iron and steel from scale, &c., due to exposure to high temperatures, and is being commercially used for such parts as engine manifolds and exhaust pipes, superheater tubes, case hardening, annealing and cyanide pots, parts of electric furnaces, fires, and cookers. The aluminium coating process is applicable to many other parts that must repeatedly withstand high temperatures, and their durability has in some instances been increased as much as a hundred times.

TRAVELLING HIGH-PRESSURE GAS BAKERS' OVENS.



BAKER PERKINS BISCUIT OVEN.

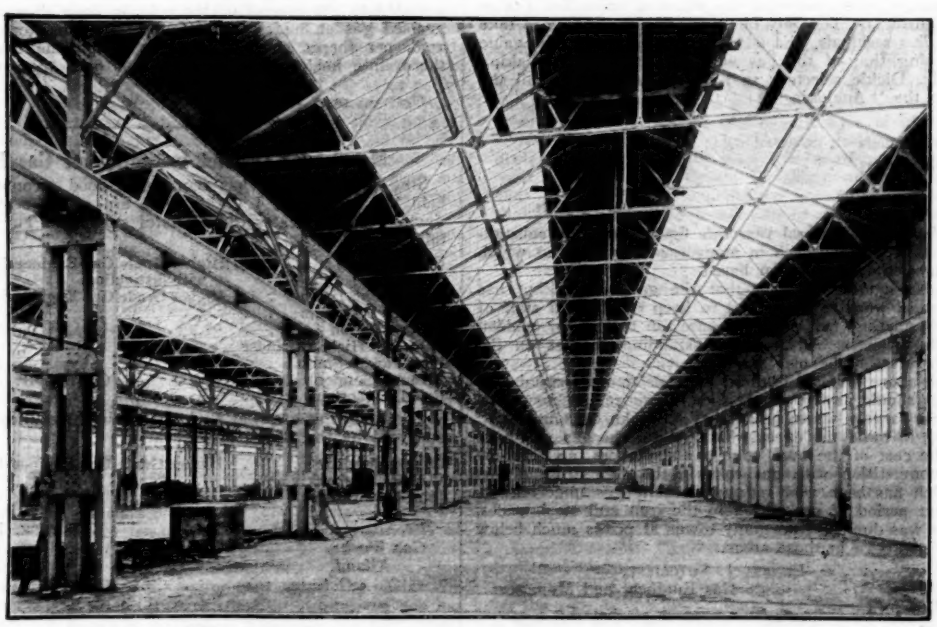
The photograph reproduced above illustrates a travelling high-pressure gas bakers' oven, as made by Messrs. Baker Perkins, Ltd., and demonstrated at the stand of Messrs. Crosby's, Bakers and Confectioners, at the North-East Coast Exhibition, the first of this type to be constructed for baking cakes, biscuits, tea cakes, and the like. The oven turns out 3000 to 4000 ordinary 3-oz. cakes an hour, and no moving or turning is required.

The rate of the travelling trays can be adjusted so that the operation lasts anything from ten minutes to an hour. With full load, this oven will take 2300 tea cakes per hour.

The maximum consumption of gas with 25 high-pressure burners is about 4200 c.ft. per hour.

LONDON METAL WORKS EXTENSION.

Messrs. Harvey's New Building.



ONE OF THE BAYS IN MESSRS. HARVEY'S NEW BUILDING.

During the last few years, we have heard a good deal about foreign competition and the depression in the British engineering and metal work industries. There is, however, conclusive evidence that, in spite of this competition, some at least of our more enterprising engineering firms have not only maintained their hold on the home and overseas markets, but are doing bigger business than ever. This gratifying result has been achieved mainly by the adoption of new and improved methods of production, together with a bold policy of expansion.

These are the causes of the success of Messrs. G. A. Harvey & Co. (London), Ltd., of Woolwich Road, S.E. 7. This well-known firm, whose works cover an area of about 25 acres, was established in 1874. It has one of the largest and best equipped plants in the kingdom for the economical production of mild steel plate work of every description. Oil tanks of the largest

size for the bulk storage of oil and petrol, structural steelwork, steel chimneys, hydraulic pressings, all form part of their enormous output of steelwork of various kinds. This firm also undertakes the design, production, and installation of plant for a large number of industrial purposes, including benzole stills, chemical, tar, and bye-product plants, water-softening installations, coal-washing plant, and tanks and containers of every description.

The vast amount of riveting and welding required in the Harvey Works has necessitated the adoption of the most up-to-date methods and equipment for carrying out these operations. In addition, these works contain one of the largest galvanizing plants in the country, which is kept busy day and night with their own trade galvanizing work.

A large part of the output at the Harvey Works consists of perforated metal and woven wire. It would, perhaps, be a difficult matter to catalogue completely the innumerable purposes these two kinds of metal-work serve in modern industry. They are extensively used for screening, grading, cleaning, sifting, separating, and filtering such widely different commodities as coal, coke, and fine chemicals.

Messrs. Harvey are specialists in both metal perforating and weaving, and they can supply these two products in iron, steel, nickel, stainless steel, copper, bronze, brass, monel metal, aluminium, delta metal, duralumin, and zinc. Steel furniture and equipment for offices, works, &c., is another branch of Messrs. Harvey's sheet metal work. All these productions are English throughout in design, material, and manufacture, and include vertical filing cabinets, cupboards, shelving, storage bins and racks, clothes lockers, wardrobes, tables, stationery cabinets, transfer cases and boxes, card index cabinets, letter trays, and waste-paper tubs. All these, and many other articles of steel equipment which they manufacture, are noteworthy for the strength and solidity of their construction, their hygienic and fire resisting character, and for the excellence of their finish.

The increasing demand for "Harvey" productions has necessitated a large extension of the works to keep pace with this demand. A new building with a floor space of over 100,000 sq. ft. has just been completed, and plant of the latest type has been installed for the production of sheet metal work on a largely increased scale. The new structure, which is brick built, and roofed with glass and corrugated asbestos sheets, is 500 ft. long, 250 ft. wide, and 38 ft. high. The floor area is divided into four bays, each over 60 ft. wide, running the entire length of the building, and electric cranes, ranging from 5 to 10 tons lifting capacity, have been installed in each bay.

This new addition to Harvey's plant will add considerably to their capacity for production on the most economical and efficient lines.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Town Gas Supply from Coke Ovens.

SIR,—I have just been reading the paper on "Town Gas Supply from Coke Ovens," by Mr. J. K. Dickie, A.M.I.Chem.E., in the issue of the "GAS JOURNAL" for Sept. 18, and feel that some of his conclusions regarding the value of coke oven gas to gas supply authorities are based upon an abnormal year's working, and are, therefore, unfair; and also that the figures he takes include many costs which should be left out of the calculations.

The year 1927-28, as all gas engineers know, brought with it a legacy from the previous year—poor coal bought at panic prices, large stocks of which, coming in after the coal dispute was settled, had to be carbonized in the following year. This increased costs, not only because of the price of coal, but also because it did not, by reason of its poor quality, give the usual yield per ton; the quantity used was greater, and the carbonizing wages per 1000 c.ft. were higher.

Then, again, the cost of gas into holder, as given in the "Gas World" Analyses of Gas Accounts, includes purification, salaries, and maintenance of works; and it is obviously grossly unfair to include these charges when assessing the value of unpurified gas at the inlet to the purifiers. The only fair way, to my mind, is to take the cost of coal *less* residuals, and add carbonizing wages, the value thus obtained being that of the gas at the point named. Taking the bad year Mr. Dickie selected, 1927-28, the averages of all the returns given in the "Analyses are:

	d.
Coal, *less* residuals	7·08
Carbonizing wages	2·73
	9·81d. per 1000 c.ft.

As inferred above, in a normal year this figure would be substantially reduced and would approach in many cases the price at which many recent transactions have been based.

Mr. Dickie also ignores the fact that the gas undertaking has to keep its plant in working order and to keep available a staff of men capable of starting the plant in case of trouble or sudden emergency at the ovens. All the usual standing charges on the plant have, of course, to be met as usual.

In view of the above facts, it is difficult to me to understand why gas undertakings should pay any more than 6d. or 7d. per 1000 c.ft. for this otherwise largely waste product of the coke oven industry; especially having in mind the effect which selling the gas will have in decreasing the cost of the oven coke to the makers, and thereby increasing the competition with gas coke in the area of supply—a competition which has been very serious to many gas undertakings during the recent period of stagnation in the iron and steel trades, when oven coke was dumped into many towns at prices much below those ruling for gas coke in those areas.

ERNEST J. SUTCLIFFE,
Gas Engineer and Manager.

Town Hall, Bradford,
Oct. 14, 1929.

Verticals v. Horizontals for Small Works.

SIR,—The paper read before the meeting of the Cumberland and Westmorland Gas Managers' Association, as published in the "JOURNAL" for Sept. 25, p. 678, is, by part statement, likely to mislead. The author, after setting forth his thesis, says: "It is not proposed to attempt to construct a typical balance-sheet for the small works." Then, developing his theme, he says: "This paper would hardly be complete without some attempt to show at what cost gas can be produced in the small works." The author then submits "a statement of actual cost realized."

The figures purport to show that gas is produced at the cost of 1·41d. per therm. Mr. Editor, like the majority of carbonizers, has construed this as cost of therms into holder. Hence the fallacy.

Again, the author laid down as an axiom: "Therms per ton is relatively more important than quantity of coke for sale per ton." Taking the figures of the paper, the anticipated coke sales were 8 cwt. per ton, and the actual coke sales 6·9 cwt. per ton. It can readily be shown, as proving the great importance of increasing the coke sold per ton of coal carbonized (a strong point of horizontal retorting), that had 8 cwt. been sold, instead of the 6·9 cwt., then the revenue from coke from this particular works would have been equivalent to 0·17d. reduction in cost per therm—*i.e.*, reducing the already low figure of 1·41d. to 1·24d. per therm.

Increased coke sales are fundamental to cheaper therms, as will be seen by reference to p. 688 of the "JOURNAL," for Sept. 25. Here the cost of therms into holder in a large and modern gas-works is given as 1s. per 1000 c.ft. (assuming 500 B.Th.U. gas) = 2·4d. per therm, and the coke oven authorities are prepared—in order presumably to get control of the coke in their district—to supply this purified gas at 8·4d. per 1000 c.ft. (assuming 500 B.Th.U. gas) = 1·7d. per therm, thus showing by comparison that the 1·41d. per therm into holder for small works is open to just criticism.

AD REM.

Oct. 2, 1929.

Manchester District Institution of Gas Engineers.

SIR,—Your reporter has sent you a good account of our meeting held last week, but I notice there are a few errors in the list of awards of Certificates to successful students. The correct list is as follows:

Eric Williams	Higher Grade Gas Engineering with distinction.	First Class
Arnold John Leather . .	Higher Grade Gas Engineering.	First Class.
Bernard Stoneham . .	" " " "	" "
Harry Allerton	" " " "	Second Class.
Ashworth Higham Pinder	" " " "	" "
John Pickup Smith . .	" " " "	" "
Arthur Beaumont . . .	" " Gas Supply.	" "
Eric Longbottom . . .	" " " "	" "

The following external students obtained Certificates which are not endorsed by the Board of Education:

Charles Johnson . . .	Higher Grade Gas Engineering.	First Class.
William Fairbank . . .	" " " "	Second Class.
John Edward Lamb . .	" " " "	" "

J. BRIDGE, Hon. Secretary.

Gas-Works,
Elland,
Oct. 12, 1929.

Repairing Holder Tanks in Action.

SIR,—I wonder if you, or any of your readers, could suggest a way of repairing or making water-tight a steel holder tank without having to put it out of action. It is half buried in good soil; the lower portion is quite good, and the upper portion out of the ground has corroded in places. Is there any solution with which it could be coated, or a "lagging of thin plates" and a solution placed between them and the tank, which would make it water tight? Any other suggestion you may have would be much appreciated.

"INQUIRER."

Oct. 11, 1929.

MISCELLANEOUS NEWS.

GAS POISONING COMMITTEE.

Hearing of Evidence.

The Committee appointed by the Government to consider and report upon the position with regard to gas poisoning, and to review the developments since the report of the Committee on Carbon Monoxide, appointed by the Board of Trade, was published in 1921, held its first meeting for the purpose of hearing evidence on Tuesday, Oct. 8, at the Board of Trade Offices, Westminster.

The members of the Committee are Sir Evelyn Cecil, Sir John Robertson, Dr. R. V. Wheeler, and Mr. F. J. Wrottesley, K.C.

The meeting on Tuesday was very short. Mr. Bowerman, M.P.—who raised this question in the House of Commons early in the year (see "JOURNAL" for April 3, p. 39)—gave evidence, and referred to the increase in the number of deaths from coal gas poisoning. He stated that during the last twenty years the amount of carbon monoxide present in coal gas has been increased from about 7 p.ct. to an amount which is seldom less than 12 p.ct., and might in some cases be more than 20 p.ct. The Carbon Monoxide Committee of 1921 had reported against the limitation of the proportion of carbon monoxide in gas used for domestic purposes, but had suggested reconsideration of this freedom from limitation if it resulted unfavourably. He hoped the Committee would look into this matter.

The Committee adjourned until Thursday, Oct. 10.

Thursday, Oct. 10.

The Committee met to-day at the offices of the Ministry of Labour, Montague House, Whitehall, when the Press and public were admitted.

The CHAIRMAN, in opening the sitting, called attention to the fact that this was a public inquiry except that the Committee had discretion to hold any portion of it *in camera* should they so desire. He was desired to say by the Committee, he added, that they had received representations from several quarters that undue newspaper publicity with regard to suicides by means of coal gas had tended to promote suicides. Without expressing any opinion on this point, he invited the Press, in the interests of the community generally, not to give undue prominence to any particular aspect of this inquiry which might have such a tendency.

The first witness was

Dr. *T. H. C. Stevenson*, C.B.E., of the General Register Office, who stated that deaths ascribed to coal gas poisoning had increased from a yearly average of 217 in 1911-20 to 1224 in 1928, and the number was increasing rapidly. The rate of increase in later years had been phenomenal. It had occurred chiefly since the war, and principally in suicides, the number of which had grown from 178 in 1918 to 1086 in 1928, the accidental deaths having increased during the same period from 81 to 136. The excess of suicidal over accidental deaths, however, was in his opinion greater than that indicated by these figures, because the accident figures included certain deaths which might have been accidental or suicidal in nature, the evidence at the inquest not sufficing to decide this point. The number of these deaths was not precisely known, but during 1921-28 there were 1366 deaths from "accidental" gaseous poisoning, of which 998 were caused by coal gas, and there were open verdicts in 236 cases. During these eight years, therefore, possibly some 150 to 200 of the 998 deaths classed as accidental coal gas poisoning were really suicidal. If about 200 really were so, the deaths classified as accidental were subject to a reduction of 20 p.ct., with a corresponding increase for suicides.

Tables of figures were handed in to demonstrate how recently suicide by coal gas poisoning had come into vogue. In 1901 there were only seven deaths so returned—six males and one female—but by 1910 the number had grown to 126—94 males and 32 females. The total rate of suicide generally by women had increased considerably above its pre-war level, and the suicide rate was rapidly increasing in the form of coal gas poisoning. It could scarcely be assumed that if coal gas had not come into vogue as a means of suicide the increased number of deaths of females, now so caused, would have occurred in any case by other means. Gas was more favoured by females than males as a means of suicide; and in view of the increase over pre-war suicides by this means, it seemed difficult in their case to exclude all influence upon the suicide rate of the new knowledge or realization of the means at their disposal. There were no doubt other causes to which the increase of suicide by women by means of coal gas might be due than the realization that the gas tap provided a convenient domestic method. The issue, in fact, could not be decided by the statistics, but would remain subject to opinion formed in the light of them. Personally, Dr. Stevenson said he felt that the greater part of the increase was probably to be expected in any case, but that the new realization of the convenience of gas poisoning had probably had some effect among both men and women, and especially among women. Comment was then made upon the curious fact that the number of suicides among women during the war fell considerably below the pre-war figures; and analyzing another table of figures of deaths which he handed in, Dr. Stevenson said there was no doubt in his opinion that the accidental deaths from coal gas poisoning were overstated, and that at the present time coal gas deaths were almost all suicidal in origin. Otherwise he would have expected to see a far larger proportion of accidental deaths among young children. Seeing that as many as 86 p.ct. of the deaths by gas poisoning were returned as suicidal, and a considerable proportion of the remainder as possibly suicidal, the question inevitably arose whether the great bulk had not been suicidal throughout. This view did not imply scepticism as to the occurrence of genuinely accidental deaths. No doubt these did occur, but the question arose as to whether the figures of accidental deaths from coal gas poisoning represented the genuine accidental cases having regard to the number of "open" verdicts that were returned. The immunity of children from coal gas accidents, and the fact that such a large proportion of deaths from this cause occurred at over 45 years of age, threw considerable doubt on the reality of the accidental nature of many of the deaths from coal gas poisoning returned as accidental.

Sir JOHN ROBERTSON asked if the Registrar-General received any information from coroners as to the incidents surrounding the deaths they inquired into, such as the mental condition of the person.

Witness said the Registrar-General usually obtained as much of the verdict in each case as was considered necessary, but he did not get any information as to whether suicides were more prevalent in a depressed industrial area than in a prosperous one. Taking all the circumstances into account, however, from the available information he had definitely come to the conclusion that there was a strong possibility that the number of accidental deaths from coal gas poisoning in the statistics were overstated, and the number of suicides correspondingly understated.

In answer to Mr. WROTTESLEY, K.C.,

Witness pointed out that suicides by coal gas poisoning were easily the highest among suicides; drowning, which used to head the list, now being second.

EVIDENCE OF MR. GOODENOUGH.

Mr. *F. W. Goodenough*, C.B.E., was the next witness, and gave evidence as Controller of the Gas Sales Department of the Gas Light and Coke Company, as Executive Chairman of the British Commercial Gas Association, and as Hon. Secretary of the National Gas Council of Great Britain and Ireland. He added that his proof of evidence had been submitted to the Gas Companies' Protection Association and had their approval, and therefore he also represented that organization. As far as the National Gas Council was concerned—which, he pointed out, represented about 90 p.ct. of the undertakings responsible for gas distributed throughout the country—Mr. Goodenough said they were willing and anxious to give the Committee every possible assistance, because they regarded it as of the utmost importance that the risk from coal gas poisoning should be reduced to a minimum, and no effort was being spared to that end. The National Gas Council, however, were of the opinion that the danger of death from coal gas poisoning relative to the danger from other causes arising out of the amenities of modern life had been seriously exaggerated. The Council desired to remind the Committee that a gas supply was now available in every town and in most villages of the United Kingdom, and that at the end of last year there were nearly 9 million individual gas supplies, indicating that nearly the entire population of the country had the benefit of a gas supply which was being given for 24 hours a day and 365 days a year. Yet the number of accidental deaths due to gas poisoning last year was only 130, and this indicated the relative freedom of the population from fatalities due to this cause. During the same year, 167 persons met their death while bathing, and no fewer than 661 persons met their death by falling downstairs. In comparison with street accidents, the number of deaths from coal gas poisoning faded into utter insignificance, because there had been 365 street accidents during the past quarter, and four people were killed every day in London alone through this cause. The Pearce Committee in 1921 had before them the 1921 figures, which showed that the risk in Great Britain from coal gas relative to the risk in the United States was quite small.

The CHAIRMAN: Would you consider the circumstances here and in the United States similar for the purpose of comparison?

Witness said he did, except that the people here were better educated in the use of gas.

Continuing, Mr. Goodenough said that a comparison between England and Germany for the year 1927 showed that the gas supply of this country involved the population in almost negligible danger. In the City of Berlin in 1927, 122 persons out of a population of 4 millions met their death from accidental gas poisoning, or over 31 per million. The figure recorded for the whole of Great Britain during the same period was 165, equivalent to 3·7 per million of the population. Thus the number of accidental deaths from gas poisoning in Berlin alone in 1927 was nearly the same as the total number of deaths from the same cause in the whole of Great Britain, with its population of 44½ millions. The fact seemed to be that the people of Germany and America did not take the care in the use of coal gas that the people of this country did; in Chicago there was a very large death rate from coal gas due to this cause.

Discussing this with the Chairman,

Witness emphasized the point that, notwithstanding this difference

between Great Britain and other countries, every possible care was being taken to prevent mishaps in this country, and in the opinion of the gas industry the number of accidents from coal gas was not increasing; and in regard to the suggestion by Dr. Stevenson that many so-called accidental deaths from gas poisoning were in fact suicides, Mr. Goodenough said he could mention many cases in which even the coroners obviously had their doubts.

The Chairman: You mean the coroner took a charitable view?

Witness: That is so. If a reasonable adjustment was made to meet this probability, the number of accidental deaths would be found to be very small indeed, and not to have increased relatively to the gas used.

The Chairman: The number of deaths from suicide have increased very largely since 1920, when they were 271, to over 1000 in 1928.

Witness emphasized the point that a number of these cases were inevitably suicide, though returned as accidental; and he suggested it would be fair to reduce the number of accidental deaths by 10 p.ct., and correspondingly increase the number of suicides. If this were done, then it would be found that the number of accidental deaths from coal gas had not increased relatively, and it would be found that the accident figures would come out as follows: 55 in 1920; 53 in 1921; 91 in 1922; 40 in 1923; 41 in 1924; 50 in 1925; 80 in 1926; 65 in 1927; and the very low figure of 22 in 1928. There was thus very good ground for saying that the number of really accidental deaths had not increased; and considering the rate at which the number of gas supplies had increased it would be true to say that the accidental deaths from coal gas poisoning had decreased relatively.

In the course of some general remarks, Mr. Goodenough pointed out that the use of gas had been largely instrumental in reducing the number of fatalities from other causes. Fog had been known to kill 150 people in one week in London, and it was very largely due to the extended use of gas that fogs were now relatively rare and certainly less pernicious. Furthermore, the general introduction of gas into the homes of the working people had brought about a reduction of deaths from lamp accidents which was remarkable. Such accidents, according to the Registrar-General's returns, reached the high figure of 171 in 1895, which was about the time the slot meter first made its appearance. In the year 1928, however, the number had fallen to 4 only—a reduction of 167, which exceeded the total number of accidents attributed to coal gas poisoning last year. Nevertheless, the gas industry had always held the view that one death from gas poisoning was one death too many, and the foregoing figures had been submitted solely with the object of aiding the Committee to view the danger in its true perspective.

Carbon Monoxide in Gas.

Mr. Goodenough then went on to deal with various suggestions that have been made from time to time with a view to minimizing such risk as at present attends the use of gas.

Speaking with regard to the limitation of the carbon monoxide content of the gas, he reminded the Committee that the terms of reference to the Pearce Committee in 1921 were restricted entirely to this point, and having weighed carefully all the facts, that Committee considered that no limitation was desirable. They suggested that the question might be re-considered should the freedom from limitation which they recommended be accompanied by unexpectedly unfavourable results. The only unfavourable result that had happened since 1921 was an increase in the number of suicides; and he attributed this very much to the publicity given at the time of the Pearce Committee and the Press agitation at the beginning of 1923, when the number of suicides leaped up. About that time there was a play "Outward Bound" which had a considerable vogue and in which some of the characters committed suicide by gas, and it was significant that there was an increase in the number of suicides around that period.

The Chairman: I am very anxious that there should be a thoroughly fair inquiry so far as this Committee is concerned, without any newspaper "stunts" taking place, because I do not think they help.

Witness then pointed out that the uncorrected number of accidents in 1928 was actually less than in 1922—the year following the report of the Pearce Committee—though in the interval the number of individual supplies of gas in England and Wales alone had been increased by over 1¼ millions and the quantity of gas sold by 43 thousand million c.ft. Since the publication of the report of the Pearce Committee the country had endured a coal stoppage for a period of eight months, and throughout this period the country enjoyed the benefit of an uninterrupted gas service, due to the fact that carburetted water gas plants were available to compensate for the absence of normal gas supplies. The prohibition of the manufacture of water gas would involve the dismantling of water gas plants, and should a similar stoppage of coal supplies occur it would result not merely in inconvenience but in great hardship to the public.

The Chairman: I take it you still agree with the report of the Pearce Committee?

Witness: I do.

The question of the total elimination of CO from gas was then dealt with, and Mr. Goodenough told the Committee that the National Gas Council did not feel that this suggestion could be regarded seriously. The question had been investigated in Germany and various processes had been carried out experimentally on a small scale. The cost of such elimination, according to the German authorities, could only be roughly estimated, but the estimate varied from 6d. to 13·3d. per 1000 c.ft. The author of a paper read this year in Berlin—Dr. Harald Kemmer, of the Berlin Municipal Gas-Works—concluded by stating that the problem of rendering gas non-poisonous was still fraught with great, if not insuperable, difficulties, and that extensive and costly experiments would have to be undertaken before it could be solved.

Another suggestion that had been made, said Mr. Goodenough, was the introduction into gas supplies of some irritant gas which would give a prompt indication of an escape, and even awaken people asleep at the time. He did not, he added, regard this as a practicable suggestion, and believed it would introduce greater dangers than it would remove. To take only the case of workmen dealing with a leakage, an irritant in the gas might easily prevent their doing their work. So far as the National Council was aware, this proposal of the introduction of an irritant gas into normal gas supplies had not even reached the stage of practical experiment. The view had been expressed by Dr. Josef Dollinger at a meeting of Austrian chemists that butyl-mercaptan added to gas caused a distinctive smell which was not absorbed on passing through earth and also had the valuable property of awakening sleepers. The Vienna Gas-Works investigated this suggestion, but could not obtain confirmation of it. The inquiry was then passed on to the University of Vienna, which went very thoroughly into the matter not merely with butyl-mercaptan, but with several other irritant gases. Some gave entirely negative results and others gave better results, but they were all expensive and, moreover, very dangerous to prepare. Artificial mustard oil and other irritant gases were then tried, but these also failed to serve their purpose and, moreover, corroded the pipes, thereby introducing fresh risks.

The National Gas Council, continued Mr. Goodenough, was aware of the publications of the United States Bureau of Mines relating to admixture with odourless gases, such as blue water gas and natural gas, of some other gas which would give an indication of an escape. It was to be noted, however, that the primary object of these experiments was the production of a distinctive odour which was not naturally present either in blue water gas or natural gas. The need for the addition of such a gas to coal gas or any mixture of coal gas and carburetted water gas now being supplied in this country did not arise, because of the distinctive and pungent odour which coal gas possessed, and which, indeed, it was required by law to possess. None of the gases which were suggested in the U.S. Report appeared to possess any property which would result in a greater measure of safety to the public.

Referring again to the question of publicity as affecting the number of suicides by coal gas, Mr. Goodenough said that the National Gas Council particularly deplored the statement not infrequently made that "carbon monoxide, which was a constituent of coal gas, was a deadly poison and was both invisible and odourless." That statement could not be refuted, but the important fact was never referred to in such cases that carbon monoxide was never supplied alone, but invariably as a minor constituent of a gas that had a strong and characteristic smell. While desirous of doing everything that was reasonable and proper for the purpose of reducing the number of suicides by the inhalation of coal gas, the National Gas Council submitted that the remedies sometimes suggested, even if they could be shown to be effectual in some small degree, would, on the other hand, result in inconvenience and danger to the user of gas for legitimate purposes and to the men employed by the gas undertakings.

Continuing, Mr. Goodenough submitted with confidence that such risk as was to-day attached to a public supply of gas could be reduced by the education of the public in the proper use of gas-burning appliances and by the systematic inspection of gas-burning apparatus, which was now the recognized practice of a large number of gas undertakings throughout the country and was being rapidly adopted by an increasing number as an essential part of gas service. Discussion of various systems of inspection and maintenance of gas appliances was an important feature of the many conferences of gas officials which took place regularly throughout the country. While it might be impossible to eliminate the human element, every step was being taken to-day which business enterprise and, indeed, self-interest dictated, to ensure that, apart from acts of individual carelessness, the risk of gas poisoning would inevitably steadily decrease.

Leakage.

The Chairman: Would you say anything about leakage? Does leakage occur very much?

Witness replied that leakage occurred sometimes from service mains, and there were at times small leaks from internal fittings, but escapes of a serious nature from internal fittings were very rare. The great cause of leaks from internal fittings was the old water-sealed chandelier, but this had been done away with now under the system of inspection that had been developed by so many gas undertakings.

The Chairman asked for information with regard to escapes from mains and also the risks, if any, attaching to prepayment meters, cookers, gas rings, &c.

Witness said he did not know of any fatal accidents that had occurred from these causes.

The Chairman asked as to the risks from rubber tubing.

Witness replied that all gas undertakings were very careful to see that the cock giving the supply to the apparatus was on the supply side, so that when the gas was turned off it was turned off from the apparatus.

The Chairman said he had some figures which showed that there had been an increase in the number of accidents due to the use of rubber tubing during the past eight or nine years. In certain other respects the figures showed a decrease in accidents—for instance, as regards defective pipes, flueless heaters, and geysers. He reminded witness that the Committee were required to inquire into what possible improvements could be made in regard to the supply of gas in the interests of public safety, and asked for any comments in this connection.

Witness replied that the figures of accidents regarding external services and mains must be viewed in the light of the very large increase in the mileage laid during recent years. There were 5000 miles of mains in London alone, and 25,000 miles throughout the country, and the accident figures in relation to these were extraordinarily small. The only figures that were large in the returns of accidents were due to the carelessness of the user, and not to anything that was preventible.

The CHAIRMAN: There has been some question of danger from prepayment meters where there are two families in a house.

Witness said the gas undertaking could not prevent a householder with a slot meter from sub-letting one or two of his rooms and allowing the sub-tenant to use the gas meter. The real trouble in this connection, however, came from different members of the same family. One member of the family might go to bed with the light on, and the gas failed through want of more money in the meter. Another member of the same family might come in late and put more money into the meter, with the result that the person who had gone to bed with the light on suffered from an escape through the tap not being turned off. No regulation could possibly stop that. It was not a question of saying that two families must not have one prepayment meter. When, however, they saw the small number of accidents due to that cause, and remembered that there were several million prepayment gas supplies, it would be appreciated how small the risk was; and he could see no remedy for it.

As regards reliability of consumers' apparatus and fittings, Mr. Goodenough pointed out to the Committee that the Gas Light and Coke Company had, at Watson House, an establishment where very careful tests were made of the supplies of fittings, &c., from the makers. Other large gas undertakings followed a similar policy, and the result had been an improvement in the general output of the makers, because they could not supply one type for a particular gas company which laid down stringent tests and another type for undertakings which did not. The South Metropolitan Gas Company carried out equally stringent tests, as did the Birmingham Corporation Gas Department and others throughout the country. As a consequence there had been a material improvement in the quality of apparatus and fittings, with a necessary reduction in the risk of leakage in consumers' premises.

Answering the Chairman as regards powers to enforce inspection of consumers' installations,

Witness said that his Company had no compulsory powers, but experience had shown they were not wanted, as the consumers welcomed the Company's men to inspect their fittings. The whole of the Gas Light and Coke Company's district was inspected in a regular and systematic manner, and the work was only limited by the ability to train sufficient skilled men for the work. The gas industry had practically become gasfitters to the country, and at the moment it was not possible to train men for this work sufficiently fast. Generally speaking, however, he felt that the industry was well on top in connection with this work.

Replying to Prof. WHEELER,

Witness said he seriously suggested that the figures for accidents from coal gas poisoning needed correction in the manner he had mentioned, and he did not wish to modify in any way his evidence as to CO content. In Plymouth during the coal strike only carburetted water gas was supplied, and there was no increase in accidents; and there was another instance where a large percentage of carburetted water gas was supplied and there had not been an accident for seven years.

Prof. WHEELER then questioned Mr. Goodenough with regard to the experiments in America concerning the addition of an irritant, and pointed out that it was also desired at that time to give the gas —mostly natural gas in America—a distinctive smell.

Witness replied that this was not necessary in the case of coal gas, as it had its own distinctive smell.

Prof. WHEELER: I come from Sheffield, and I cannot say the same. I have had escapes in my house which have been very difficult to detect by smell.

Witness said he did not think there was any need to add anything to coal gas to make the smell more noticeable in case of a leak.

Replying to Sir JOHN ROBERTSON,

Witness said there had been cases of accident where a street main had been fractured and the gas had leaked into adjoining houses, and it was generally the case that the fracture of the main was due either to frost or heavy street traffic. There had been, however, far more cases of broken water mains than gas mains. The fracture of gas mains due to frost arose from the change of temperature causing the metal to expand and contract.

Sir JOHN ROBERTSON: Is there any indication at the gas-works when such leakages occur?

Witness: No. The first indication we get is by somebody informing the police or the fire brigade, or telephoning to one of our offices.

Sir JOHN ROBERTSON: Would not such fractures be avoided if the mains were laid at a greater depth?

Witness replied that, considering the number of mains and services in the streets, the number of failures was extremely small. The pipes remained in a good condition for many years; in the case of the Holborn explosion, some of the mains that had to be opened up were in as good condition as when they had been put down many years previously, though a great deal depended upon the nature of the subsoil. Heavy road traffic did not affect services, which were usually laid under the footways.

Asked as to the causes of accidental deaths in dwelling-houses, Mr. Goodenough said that they were nearly always due to carelessness on the part of the user. Out of 1000 deaths, between 600 and 700 were due to taps being left on. As regards inspection, it was stated, in reply to another question by Sir John Robertson, that the Birmingham Corporation Gas Department had spent £30,000 in five years on the inspection and replacement of consumers' fittings, it often being found that a consumer would not replace an old fitting unless a new one were supplied to him by the gas undertaking free of charge. This referred to slot meter installations only, and the same system of inspection was being carried into the houses of the ordinary users of gas. The increase in inspection on the part of gas undertakings was having a very healthy effect in reducing the possibility of accident, apart from carelessness.

Answering further questions by Sir John Robertson with regard to inspection, Mr. Goodenough said that, in the case of the Gas Light and Coke Company, their men were in houses of the prepayment meter consumers eight times a year for the collection of the money, and thus would come into contact with any troubles that might be experienced, and would have them put right immediately. Experience had shown that inspection was not necessary at very frequent intervals. If there were inspections at really frequent intervals, it would add to the cost of gas; but, as he had said, it was not necessary.

Mr. WROTTESLEY, K.C., asked for the accident *plus* suicide figures for Berlin, and was given a figure of 122 accidents and 589 suicides in 1927, while for the Kingdom of Prussia, Mr. Goodenough said the figures were 327 accidents and 1171 suicides in the same year, the population of Berlin being 4 millions and of Prussia 37 millions.

Speaking of the reference by witness to the influence of the use of gas upon reducing fogs, Mr. WROTTESLEY suggested that electricity also played a part.

Witness agreed that electric power had also assisted, but added that cooking was done almost entirely by gas nowadays in the large towns, and thus reduced the smoke from the domestic chimney. It was possible to walk down a suburban street on a Sunday and see not a single chimney smoking, and yet there would not be a single electric cooker in use.

Mr. WROTTESLEY asked if anything had been tried in the direction of a tap which would close unless the gas was lit after a certain period.

Witness said that had been tried, but he had not yet seen a device that was likely to be really satisfactory or to act when it was wanted.

Mr. WROTTESLEY: The trouble would be that people would not trouble to turn off the tap at all; there would be a feeling of security that was not warranted?

Witness agreed.

Mr. WROTTESLEY: If the Committee were not satisfied to recommend the Government to leave matters quite as they are, whether from the point of view of suicide or accident, and that we felt that something ought to be done, what do you think the gas industry would rather have in such a case? Which alternative would be most likely to suit the gas industry—the limitation of CO, which does not go the whole way; the elimination of it; or the introduction of an irritant gas?

Witness: It is difficult to be sure that anything that could be done would prevent suicide.

Mr. WROTTESLEY: Suppose it is thought necessary to do something? I am trying to get some idea of what the attitude of the gas industry would be.

Witness: I say quite frankly I would rather not answer that question. If you insist on a reply I would rather the gas industry had an opportunity of considering the matter and giving you a reply. So far, we do not see any practical suggestion we can make to you.

Mr. WROTTESLEY put questions with regard to inspections, and asked as to what was being done by the smaller undertakings.

Witness said he thought that the industry as a whole was going on in a very satisfactory way in regard to this matter. All the important undertakings were actively dealing with inspection, and most of the smaller undertakings were also. A great deal of propaganda was being carried on in the industry in connection with it, and practically every undertaking was working on the lines he had indicated in greater or lesser degree.

Answering questions as to leakage, Mr. Goodenough said that, after careful investigations, the Gas Light and Coke Company were satisfied that this did not amount to more than ½ p.ct. of the output.

Mr. WROTTESLEY: You have no power to prescribe fittings?

Witness: No; and I do not think we want them.

Sir JOHN ROBERTSON put some questions with the object of ascertaining whether it would be possible to place gas ovens in a position which would make suicide very difficult.

Witness replied that, if a joint could be put into the oven, then a person desiring to commit suicide would be able to put his head into it.

Sir JOHN ROBERTSON also asked as to the possibility of arranging the supply of gas so that it went out when the oven door was opened.

Witness expressed the view that any such device would be impracticable and dangerous, and that there would be explosions.

Answering the CHAIRMAN with regard to the percentage of CO in town gas,

Witness said he had not gone into that in his evidence because it was considered so fully by the Pearce Committee, which said that nothing should be done. If the present Committee were to think of a serious restriction of the CO, then he would wish to put forward some very strong claims on behalf of carburetted water gas, which not only helped to make gas manufacture an economical process, but was of enormous advantage in times of emergency.

The CHAIRMAN: I think it is within the reference to the Committee to consider the question, if necessary.

Witness: Any serious limitation of carburetted water gas would have very grave economical effects which would be reflected in the cost of gas to the public.

The Committee then adjourned until Tuesday, Oct. 15.

Price Question Discussed at Matlock.

At a meeting of the Matlocks Urban Council, the Matlock Bath Gas Committee reported that they had had under their consideration the question of the ruling price of gas and the effect of a reduction of the price to consumers taking over 20,000 c.ft. per quarter. The Committee recommended the Council to reduce the price of gas by 3d. per 1000 c.ft. to consumers of over 20,000 c.ft. per quarter. In view of the expense of immediate repairs required at the Gas-Works, including the re-laying of retorts at a cost of £217, the Committee did not consider the present time was opportune for any reduction to the whole of the consumers. The Council felt that if any reduction in the price of gas was possible the poorer consumers in the district should not be overlooked, and they referred the recommendation back to the Committee for further consideration.

CENTRALIZATION AT BARROW.

Adoption of Therm System of Charging.

At the Barrow-in-Furness Town Council meeting, on Monday evening, Oct. 7, Mr. Holland, Chairman of the Gas and Water Committee, moved the adoption of the minutes, which stated:

The Town Clerk, the Treasurer, and the Manager submitted a joint report giving particulars regarding the Order which the Gas Administrative Board propose to make under the Gas Undertakings Act, 1929, and recommend that, in order to comply with the Act, the system of charge be varied from 3s. 9d. per 1000 c.ft. to 9·48d. per therm for gas supplied by ordinary meter, to take effect as from the readings of the meters in the March quarter, 1930, and from 4s. 2d. per 1000 c.ft. (including free stove) to 10·53d. per therm by prepayment meter; and that the declared calorific value of gas supplied from April 1 next be 475 B.Th.U. It was resolved: That the recommendations be approved, and that the Town Clerk take the necessary steps to comply with the provisions of Section 6 (3) of the draft Order when made.

The minutes were approved by the Council. In regard to the centralization of the gas-works, a Sub-Committee was asked to confer with the Manager as to the preparation of estimates and obtaining of tenders for carrying out the necessary works in connection with the centralization of the gas-works at Salthouse.

LECTURES ON SMOKE ABATEMENT.

An interesting series of lectures, organized by the National Smoke Abatement Society, is to be held in Manchester next month and in December. The course is primarily intended for those taking part in smoke abatement propaganda, but is open to all. The lectures will be of an educational character, and will deal with the subject in non-technical language.

SYLLABUS.

Friday, Nov. 8.—"Coal and Its Combustion." By Andrew McCulloch, M.Sc.Tech., A.I.C., Lecturer in Fuels in the University of Manchester, and Head of the Fuel Department of the College of Technology.

Friday, Nov. 15.—"Smoke and Health." By John S. Taylor, M.D., D.P.H., Assistant Medical Officer of Health, Manchester.

Friday, Nov. 22.—"Smokeless Fuels." By William Gibson, M.Sc.Tech., A.I.C., College of Technology, Manchester.

Friday, Nov. 29.—"The Abatement of Domestic Smoke." By Marion Fitzgerald, Associate Royal Sanitary Institute. Part Author of "The Smokeless City" and of "Home Fires Without Smoke."

Friday, Dec. 6.—"The Abatement of Industrial Smoke." By R. Morton Rowe, Chief Smoke, Chemical, and Technical Inspector, Public Health Department, Manchester.

Friday, Dec. 13.—"General Aspects of the Smoke Problem." By Arnold Marsh, M.Sc.Tech., Secretary of the Smoke Abatement League of Great Britain.

The lectures will be given at the College of Technology, Sackville Street, Manchester, and will commence at 7 p.m. Opportunity will be given at the close of each lecture for discussion and questions. A nominal registration fee of 5s. to cover expenses will be charged for the complete course of lectures, or a fee of 1s. for any single lecture.

All inquiries should be addressed to Mr. Arnold Marsh, M.Sc.Tech., Secretary, National Smoke Abatement Society, 23, King Street, Manchester.

SMOKE ABATEMENT CONFERENCE AT BUXTON.

Paper on Industrial Uses of Gas.

When the Coal Smoke Abatement Society and the Smoke Abatement League of Great Britain decided to merge into one body under the title of the National Smoke Abatement Society, they could not have chosen a more suitable place for the birthplace of the new organization.

Before opening the conference, the Mayor of Buxton (Councillor S. L. Pettitt) said he thought the delegates would agree that Buxton was one of the cleanest and brightest spas in the country.

Dr. A. Des Voeux, Chairman of the Coal Smoke Abatement Society, was appointed President, and Alderman W. Mellard, of Manchester, Chairman of the Smoke Abatement League, Chairman.

Mr. Samuel Tagg, Engineer and Manager to the Preston Gas Company, was unable to attend the conference, and his paper on "Industrial Uses of Gas," which was published in our issue for Oct. 9, was read by Mr. J. Boxhall James, Assistant Secretary of the Company.

In the discussion which followed, Mr. Beaumont, Chief Sanitary Inspector of Halifax, asked if it was practicable for the gas undertakings in this country to manufacture low-temperature smokeless fuel, to augment the present inadequate supplies, and to cheapen them. The matter had been under consideration by the West Riding Smoke Abatement Committee, who sent a resolution to the Minister of Health recommending him to take steps to impress upon all gas undertakings in the country, as far as local authorities were concerned, the desirability of adopting something along these lines.

A Scottish delegate said that in Glasgow the authorities had made arrangements with a Company to take 20 million c.ft. of gas per day produced by a low-temperature carbonization process.

Mr. Adams, of Newcastle, said they used coke for industrial heating because the cost for gas or electricity was substantially higher.

Replying, Mr. Boxhall James said it was not his intention to deal with any particular question, because the object of the paper was to indicate the enormous development that was taking place in the use of gas. There was, however, no doubt that the use of both electricity and gas had been brought about largely through the desire to abate smoke. Low-temperature carbonization had been the subject of intense research work of recent years; and with the propaganda that was going on, there was no doubt that the future would prove whether low-temperature carbonization afforded a solution to the smoke evil. With regard to the application of gas to industry as a whole, they could claim 3000 different processes in which gas was being used satisfactorily. Rarely did one find a manufacturer who was not prepared to adopt gas, because it meant the elimination of smoke and an improvement in the conditions of the workpeople, as well as more rapid and efficient production.

Mr. Brownhill Smith, of Glasgow, said that the ideal of the future was the working side by side of gas and electricity undertakings.

In the afternoon some of the delegates went for a motor tour round the High Peak, while in the evening there was a dinner followed by an informal discussion.

At a meeting on Sunday morning, the constitution and organization of the newly-formed Society were agreed upon, and the conference concluded in the afternoon with a meeting of the Committee.

NEW CARBONIZING PLANT AT SILSDEN.

Opening Ceremony.

As reported in the "JOURNAL" last week, the formal opening took place, on Oct. 8, of the new continuous vertical retort installation at the Silsden Urban District Council's Gas-Works. The new installation, which has brought the work completely up to date, is a Woodall-Duckham plant costing £9200. It has a gas-making capacity of 270 million c.ft., and brings the Council's total expenditure from loans to the sum of £30,167. The present total outstanding debt on mains and works is £16,100. The original Silsden gas undertaking, opened in 1904, provided for the manufacture of 12 million c.ft., but the town was buying gas in bulk from the Kildwick Parish Gas Company as far back as 1878. That maximum was maintained from the commencement, and there have had to be subsequent additions of plant to cope with growing demand. During the current year the manufacture was 36 millions, and demand is still growing. The new plant is expected to meet all demand for many years to come.

Mr. Tom Snowden, M.P. for Accrington, and Chairman of the Bingley Lighting Committee, as a member both of a gas and electricity committee, said he was convinced that gas was the better for domestic heating and cooking purposes. To his mind, Parliament ought, without delay, to give the gas undertakings of the country better facilities than they at present enjoyed, and should repeal old Acts which were crippling the industry. If electricity was to be a competitor of gas, he said, let it at any rate be fair competition.

In presiding over the opening ceremony, Mr. C. Hardcastle, Chairman of the Silsden Gas Committee, paid high tribute to the services of the Council's Gas Engineer, Mr. Morris Driver, who had throughout advised the Committee as to the requirements of the situation; they had had no outside advice whatever, and Mr. Driver's advice had proved sound in every respect.

GAS METER TESTING IN EDINBURGH.

The number of gas meters tested and examined at the Gas Meter Testing Department, Edinburgh, during the year May 16, 1928, to May 15, 1929, amounted to 71,316—634 wet meters and 70,682 dry meters; and fees to the amount of £4045 7s. were earned. The total number of meters tested and examined by this Department since its institution in 1861, up to and including May 15, 1929, amounts to 3,856,222—the fees received for the same period being £129,987 6s. 9d.

There are now seven District Gas Meter Testing Stations under the jurisdiction of the Magistrates (the Local Authority for the administration of the Sales of Gas Acts).

The following tables show the monthly statistics of work done and fees earned for the year; and the percentage of meters rejected.

Month Ended.	Dry Meters.		Wet Meters.		Total Meters.		Fees.
	Tested.	Incorrect.	Tested.	Incorrect.	Tested.	Incorrect.	£ s. d.
1928.							
June	8,177	97	19	0	8,196	97	469 2 0
July	5,290	67	22	1	5,312	68	298 5 0
August	3,860	50	38	3	3,898	53	220 12 6
September	5,493	56	127	0	5,620	56	325 4 0
October	5,433	72	38	1	5,471	73	307 6 0
November	6,499	110	75	4	6,574	114	361 6 6
December	6,072	57	46	2	6,118	59	347 8 3
1929.							
January	5,078	68	80	1	5,158	69	299 6 0
February	7,577	115	30	0	7,607	115	424 16 0
March	5,553	84	57	2	5,610	86	321 12 0
April	5,776	71	54	0	5,830	71	329 18 3
May	5,874	57	48	0	5,922	57	340 10 6
Total	70,682	904	634	14	71,316	918	4045 7 0

ABSTRACT.

—	—	Rejected as Incorrect.	Per Cent.
Total dry meters tested	70,682	904	1·28
Total wet meters tested	634	14	2·21
	71,316	918	1·29

BRITISH TAR.

Importance of a Ready Market.

The following letter by Mr. Arthur E. Collins, Past-President of the Institution of Municipal and County Engineers, has been addressed to the Press, on the subject of British tar for home use:

"I have been much interested in Sir William Wayland's appeal* to our County Councils to use home-produced tar for road surfacing, instead of imported materials giving results which are no better and in some respects worse. I have probably had a longer experience of road-making and maintenance than any other road engineer now in practice, and I know of no material in use for road-surfacing superior, for the vast majority of our highways, to properly prepared and applied coal tar. In speaking of road tar, I do not exclude special preparations sold under a proprietary name, some of which are of great value in difficult conditions.

"The importance of a ready market for British tar cannot be exaggerated, for the cost of such essentials as gas and steel are materially affected by the price obtained for tar. If the producers of gas or coke cannot sell their tar for the roads, the position will become very serious for these industries and their thousands of employees. Wherever possible, therefore, highways authorities and their road engineers should insist on the use of British tar, in preference to any foreign material."

Sir Henry Page Croft has also addressed a letter to the Press. It is as follows:

"Sir William Wayland, M.P., has called attention to the increasing tendency to use foreign bitumen in place of British tar as a surface dressing for our roads.

"This change in road-making practice is a serious matter for such industries as gas, iron, and steel, which produce over 2 million tons of crude tar a year as a bye-product, and depend to a large extent on securing an economic market for their tar output. The coal industry also stands to suffer severely from the fall in the demand for road tar, as is indicated by the fact that the surface dressing of one mile of road requires 2000 gallons of tar, which are, in turn, a bye-product from 200 tons of coal.

"The economic use of 200 tons of coal in the gas and the steel industries, therefore, depends on the securing of a tar order for one mile of road. If this tar order is not forthcoming the whole delicate adjustment of prices between gas and its bye-products (or steel and its bye-products) is disturbed, with the danger that, as compensation for the loss of a tar market, the prices of gas and steel will have to be raised, thus producing further difficulties.

"As regards price, ease of application, and durability, tar is, I believe, at least equal to bitumen as a road-dressing material. Further, it has the advantage that, whereas bitumen becomes smooth and slippery with wear, tar retains a surface which gives an effective grip to motor tyres. Tar, therefore, is essentially the non-skid material for road surfaces. The Ministry of Transport takes the view that either bitumen or tar is suitable as a road dressing, subject to the material conforming to certain standard specifications.

"In the absence of definite commercial and technical advantage on the side of bitumen, there are the strongest grounds for pressing the Ministry of Transport to make the use of British tar a condition of loans from the Road Fund. British roads should be made of British materials."

A Few Reflections.

It would appear to be held probable in some quarters that the subject of "British Tar for British Roads," which is receiving so much attention in the Press and elsewhere at the present time, may become a political issue of some importance when Parliament reassembles; and the Ministry of Transport should take some definite view of the matter; and, as Sir Henry Page Croft has suggested, make the use of British tar a condition of support from the Road Fund. Opinions expressed by leading road engineers from all parts of the country point to the fact that British prepared tar is a better proposition than imported asphalts and bitumens, both technically and financially. The present position is distinctly abnormal, and decidedly unfair to the British industries dependent for their success, to a large measure, on finding an adequate outlet for this important bye-product. Vital facts of great interest to road engineers, county surveyors, and motorists have just been made available by Mr Gibson, County Road Surveyor for Western Perthshire.

These indicate the results of a fourteen years' test on an experimental portion of the Great North Road. The road was laid in June, 1915, near Dunblane, and contains nine different sections, each of 100 yards in length, and it is estimated to have carried over three million tons of traffic during the period under review. It is significant that, of the nine different processes used, the best results were obtained from the portions on which British road tar was used. The actual section giving the most satisfactory results was termed "a tarred material surface sealed with distilled tar;" and this portion is stated also to have proved the most economical. The cost of construction and maintenance for this section during the fourteen years was under 4s. for each super yard, as compared with over 12s. in a section where foreign bitumen was used. The cost per ton per mile was also found to be considerably lower on the tarred portions, and to require less attention, only having to be painted with a tar coating once every two years. Ordinary macadam as a wearing surface proved, according to the words of the report, "hopelessly unsuitable for main road traffic." This should surely prove to our road engineers who may still have doubt on the matter as conclusive evidence in favour of British produced tar in competition with any other road dressing material. Indeed, the only disadvantage, from the producers' point of view, at any rate—and it is, after all, with the producers that we are more intimately concerned—is the fact that the tar is of such high quality that the roads only appear to require a dressing once in two years. But this in itself is advertisement enough for the home produced material. True, there is another small disadvantage claimed—that where roads drain directly into rivers which are used for fishing it must be granted that tar is more toxic than bitumen. But such roads only constitute about 5 p.ct. of the total road length of the country; and if the bitumen dressing were applied to them alone, tar producers would have very little cause to grumble—if they could obtain the other 95 p.ct.

If, in fact, tar is of little good for roads, how can it be explained that over three million gallons, during the past year, have been sprayed on roads within an area of 45 miles round London; and that 600,000 tons a year are being used on roads throughout the country?

The British Road Tar Association is doing fine work towards counteracting the tendency in certain districts to use imported dressings for road surfaces, and their efforts are undoubtedly meeting with success. At the same time, however, it has been suggested that the work of the Association would be considerably facilitated by an official Government pronouncement. A comment by our contemporary, "The Chemical Trade Journal," in this connection, would seem to sum the matter up: "Were British tar not quite equal," it states, "value for value, to foreign material for road-making purposes, a strong case would even then exist for the State promotion of its use in furtherance of the general industrial welfare of the community; but, as conditions actually are, the case is overwhelming."

* This was published in our columns last week.—Ed. "G. J."

SOUTH AUSTRALIAN GAS COMPANY.

Annual Meeting.

The Sixty-Eighth Annual Meeting of the Shareholders of the South Australian Gas Company was held in Adelaide on Aug. 29.

The CHAIRMAN, in moving the adoption of the report and balance-sheet, said: Before asking you to adopt the report and balance-sheet, there are a number of features to which I wish to refer. The first of these is that after paying the usual dividend for the first half-year, the profits remaining at June 30 were only sufficient to pay a dividend at the rate of 7 p.ct. per annum for the second half-year, after which the small amount of £3292 was available for the special purposes fund, leaving £940 to be carried forward to the credit of profit and loss account.

MAKE OF GAS AND BYE-PRODUCTS.

The following tables will be of interest:

	1927-28.	1928-29.
Coal carbonized	104,718 tons	106,082 tons
Gas made	1,526 million c.ft.	1,549 million c.ft.
Number of consumers	63,016	65,412
Cookers sold	5,000	4,008
Bath water heaters sold	2,168	1,506
Wash-coppers and burners sold	2,563	1,802
Fires and radiators sold	1,020	586
Value of sales and orders for fixing appliances	£105,805	£87,434

During the year our Cookery Lecturers have conducted 140 practical demonstrations in the Lecture Hall, at which 4479 persons attended, and in addition they have given 5109 demonstrations in the use of cookers and other gas appliances in private houses. During the year, also, there were laid 45 miles 1236 yards of new mains, comprising 16 miles 537 yards of cast iron for low-pressure supply and 29 miles 699 yards of steel for high-pressure supply.

The CHAIRMAN then moved the adoption of the report and accounts.

Mr. ALLAN A. SIMPSON, C.M.G., O.B.E., seconded.

Mr. S. J. LAIDLAW said he had several questions to ask. He wanted to know from the Chairman how long 30,000 tons of coal would last the Company in its operations.

The CHAIRMAN: About 15 weeks.

Mr. LAIDLAW: Is there much depreciation on coal that is kept in stock?

The CHAIRMAN: No; practically none.

Mr. LAIDLAW: Would it not be a good scheme, in view of the number of strikes, to hold a larger stock of coal? The interest should be infinitesimal compared with the extra cost of importing.

The CHAIRMAN: The amount represented is £60,000 lying idle, which does not cheapen operations.

Mr. LAIDLAW: Is it not worth while to keep a double quantity?

The CHAIRMAN: It is an interesting line of inquiry, and has had great consideration by the Board. I am thankful to say that these strikes do not occur very often.

Mr. LAIDLAW: When they do occur, it is serious indeed. I raised the question with the late Sir George Brookman, who said that, though there was some deterioration, it would pay to keep larger stocks than had been the case. There is another point I want to stress. Would it not be a good thing to initiate a preference share issue? That is a most popular form of investment in Australia. Dividends from all preference share issues do not bear State income-tax. It is a favoured form of investment, and the time will come when it will be found that the debenture issues will not be well balanced. I hope that you will not be stampeded by the unfair statements of some fanatical people looking for cheap notoriety. This Company has a right to earn profits sufficient to pay 8 p.ct. to its shareholders.

Mr. W. RAY then asked how much more productive the Maitland coal was than the imported product.

The CHAIRMAN: Between 1500 and 2000 c.ft. per ton.

Mr. H. G. WILLCOX said that he had been a consumer for many years, and any time that there had been defective service in the supply it had been remedied in a short space of time. He thought that the times through which the Company were passing and difficulties in regard to the coal position had been real obstacles, but the Company had done well up to date.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *Oct.* 14.

The prices of tar products continue unchanged.

Pitch is about 47s. 6d. per ton f.o.b.

Creosote for export is 6¾d. per gallon; pure toluole, 2s. 3d. to 2s. 4d. per gallon; 96/160 solvent naphtha, about 1s. 5d.; pure benzole, about 1s. 11d. per gallon; and pyridine bases, 3s. 9d. to 4s. per gallon.

Tar Products in the Provinces.

Oct. 14.

Markets for tar products are, generally speaking, without alteration.

Pitch is still firm, and business continues to be done at 47s. 6d. f.o.b. for delivery to the end of next year.

Creosote shows no alteration in the market.

Crude carbolic is still very firm; 2s. 5½d. is reported to have been paid for delivery all over next year.

Cresylic acid is steady, and a fair amount of business is passing.

In crystals the market is still very high for delivery to the end of the present year; but makers are inclined to accept somewhat lower figures for next year's delivery.

Water-white products are generally firm.

The average prices of gas-works products during the week were: Gas-works tar, 25s. to 30s. Pitch—East Coast, 47s. 6d. f.o.b. West Coast—(f.a.s.) Manchester, 42s. to 42s. 6d.; Liverpool, 45s. 6d. to 46s. 6d.; Clyde, 45s. 6d. to 46s. 6d. Toluole, naked, North, 1s. 7½d. to 1s. 8½d. Coal-tar crude naphtha, in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 1s. 3d. to 1s. 3½d. Heavy naphtha, North, 1s. to 1s. 0½d. Creosote, in bulk, North, liquid and salty, 3¼d. to 3½d.; low gravity, 2d. to 2¼d.; Scotland, 3¼d. to 3½d. Heavy oils, in bulk, North, 5½d. to 6d. Carbolic acid, 60's, 2s. 5½d. to 2s. 6½d. prompt. Naphthalene, £12 to £14. Salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

Benzole Prices.

The following are considered to be the market prices to-day:

	s. d.		s. d.	
Crude benzole . . .	0 10	to	0 11	per gallon at works
Motor ,, . . .	1 5	,,	1 6	,, ,, ,,
90 p.ct. ,, . . .	1 7	,,	1 8	,, ,, ,,
Pure ,, . . .	1 10	,,	1 11	,, ,, ,,

GAS ACTS (1920 AND 1929) ORDERS.

SECTION 6.

Birkenhead Corporation.

The Corporation shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

Buxton Corporation.

The Corporation shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

Clacton Urban District Council.

The Council shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

Darwen Corporation.

The Corporation shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

Gainsborough Urban District Council.

The Council shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

Hereford Corporation.

The Corporation shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

Llandudno Urban District Council.

The Council shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

Malvern Urban District Council.

The Council shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

Middleton Corporation.

The Corporation shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

Stourbridge Corporation.

The Corporation shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

Tredegar Urban District Council.

The Council shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

Wallasey Corporation.

The Corporation shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

Workington Corporation.

The Corporation shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

SPECIAL ORDERS.

Biggleswade and District Gas Company.

To authorize the Company to borrow on mortgage of their undertaking, or by the creation and issue of debenture stock, any amount not exceeding the aggregate amount of the paid-up share capital of the undertaking for the time being and of any premiums paid in respect thereof.

Haslemere and District Gas Company.

To confer further capital powers upon the Company.

Spalding Urban District Council.

To enable the Company to purchase additional lands, to make further provisions as to the supply of gas, to prescribe the mode of raising money, and to increase the maximum price to 6s. per 1000 c.ft., instead of the present figure of 5s. 6d.

DECLARATIONS OF CALORIFIC VALUE.

Bingley Urban District Council.—480 B.Th.U. (April 1, 1930).
Heywood Corporation.—450 B.Th.U. (April 1, 1930).

TRADE NOTES.

"Vibro" Conveyors.

The Underfeed Stoker Company, Ltd., of Africa House, Kingsway, W.C. 2, announce that they have secured the sole manufacturing rights for "Vibro" conveyors, under the Schenck-Heymann system, the conveyors being manufactured entirely at the Company's works at Derby.

Semet-Solvay and Piette Coke Oven Co., Ltd.

We are informed that the name of the above Company has been changed to Chemicals & Coke Ovens, Ltd., with the registered office at Howard Chambers, 155, Norfolk Street, Sheffield, as before. The telegraphic address has also been altered to "Chemunion." We are also notified that an office has been opened at Vintry House, Queen Street Place, E.C. 4.

"Arca" Automatic Regulators.

From British Arca Regulators, Ltd., of Windsor House, Victoria Street, S.W. 1, we have received a brochure on the firm's automatic regulators. The "Arca" automatic regulator is an invention which ensures complete automatic control of any physical state, such as pressure, temperature, &c., in almost any manufacturing process. Such control, if properly carried out, achieves one or more of the three following objectives: Reduced manufacturing costs; improved products; and increased output. The "Arca" regulator is the outcome of an invention originally intended for the various requirements in paper mills; the principle employed, however, is equally applicable to any manufacturing process requiring regulation, or stability of a physical state.

OVERSEAS OPPORTUNITIES.

[From the Board of Trade Journal.]

British India.

House Service Meters for Indian Stores Department, New Delhi. Order No. N.10,282.).—H.M. Trade Commissioner at Calcutta reports that the Indian Stores Department, New Delhi, is calling for tenders, to be presented by Oct. 28, for the supply and delivery of house service meters required during the period Jan. 20, 1930, to Jan. 19, 1931. Firms desirous of offering material of British manufacture can obtain further particulars of this call for tenders on application to the Department of Overseas Trade, 35, Old Queen Street, London, S.W. 1. (Ref. B.X. 5749.)

Iraq.

Welded Steel Tubes.—The Department of Overseas Trade has received a communication from a distributor of engineering products in Bagdad, who is desirous of forming a connection with British firms in a position to supply light welded steel tubes with welded-on flanges suitable for pump suction and discharge, in the following sizes: 8 in., 10 in., 12 in., 14 in., 16 in., and 20 in. internal diameter, in lengths 2 ft., 3 ft., 4 ft., 6 ft., and 9 ft., together with bends. Firms desirous of offering suitable tubes of British manufacture can obtain the name of the inquirer and further particulars upon application to the Department of Overseas Trade, 35, Old Queen Street, London, S.W. 1. (Ref. A.X. 8622.)

The Lancaster Town Council have approved the change-over from the 1000 c.ft. to the therm system of charging by the Gas Department.

The Halifax Corporation Gas Committee have received sanction from the Ministry of Health to borrow £10,000 for installation of automatic clock controllers on the public gas lamps.

The Plymouth Corporation Gas Committee has received the sanction of the Ministry of Health to the borrowing of £25,000 for the purchase of gas meters, automatic installations, and stoves.

STOCK AND SHARE LIST.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. Oct. 11.	Rise or Fall on Week.	Transactions Lowest and Highest Prices.
£			%p.a	% p.a.				
171,978	Stk.	Aug 15	5	5	Aldershot 5 p.c. max. C. .	10—75	..	..
412,992	,,	,,	4	4	Do. 4 p.c. Pref. . .	73—76	..	..
1,551,868	,,	Sept. 26	7⅜	7⅜	Alliance & Dublin Ord. .	95—98	..	96—97½
274,000	,,	July 11	4	4	Do. 4 p.c. Deb. . .	62—65	..	..
892,555	,,	Aug. 29	7	7	Barnet Ord. 7 p.c. . . .	112—115	..	..
300,000	1	May 9	1/4⅛	1/4⅛	Bombay, Ltd.	⅛—⅛	..	17/6—18/-
172,500	10	Aug. 29	8½	9	Bournemouth 5 p.c. . . .	12⅝—13⅛	..	..
800,000	10	,,	7	7	Do. B 7 p.c. . .	12½—12⅝	..	..
439,160	10	,,	6	6	Do. Pref. 6 p.c. .	10½—11	..	..
60,000	Stk.	July 11	8	8	Do. 8 p.c. Deb. .	54—57	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb. .	72—75	..	..
357,900	,,	Aug. 29	7½	7½	Brighton & Hove 5 p.c. Con.	113—116	..	..
271,880	,,	,,	6⅔	6⅔	Do. 5 p.c. Con.	100—103	..	..
1,387,500	,,	July 25	5	5	Bristol 5 p.c. max. . . .	88—89a	−1	..
885,000	,,	Sept. 12	7½	7	British Ord.	115—11 8	..	115½—116
100,000	,,	June 27	7	7	Do. 7 p.c. Pref. . .	112—117	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. .	71—74	..	72
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. .	94—97	..	96½—96½
180,000	10	May 30	6	8	Cape Town, Ltd. . . .	9—10	..	9½
100,000	10	Apl. 24	4½	4½	Do. 4½ p.c. Pref. . .	6½—7½	..	..
150,000	Stk.	June 27	4½	4½	Do. 4½ p.c. Deb. . .	71—76	..	..
656,860	,,	July 25	6	6	Cardiff Con. Ord. . . .	98—101	..	..
227,860	,,	June 27	7½	7½	Do. 7½ p.c. Red. Deb. .	99—102	..	..
187,180	,,	Aug. 15	5	5	Chester 5 p.c. Ord. . . .	87—92b	..	..
98,936	1	Oct 10	1/-	1/-	Colombo Ltd. Ord. . . .	34/—36/-*	−1/-	..
24,495	1	,,	1/4½	1/4½	Do. 7 p.c. Pref. . .	19/—21/-*	−1/-	..
275,402	1	Oct. 10	1/9½	1/9½	Colonial Gas Assn. Ld. Ord	23/6—25/6*	−1/-	..
187,848	1	,,	1/7½	1/7½	Do. 8 p.c. Pref	20/—22/-*	−1/-	..
9,073,380	Stk.	July 25	7	5	Commercial Ord. . . .	93—96	..	93
475,000	,,	June 13	8	8	Do 8 p.c. Deb. .	56—59	..	..
187,550	,,	Aug. 15	7	7	Croydon sliding scale . .	105—108	−1	105—106
469,100	,,	,,	5	5	Do. max. div. . . .	81—84	..	82
542,270	,,	Aug. 29	10	7	Derby Con.	118—121e	..	..
55,000	,,	June 27	4	4	Do. Deb.	68—71e	..	..
999,000	,,	Aug. 29	5	5	East Hull Ord. 5 p.c. . .	78—75	..	..
1,009,180	10	Sept. 12	†7	†4	European, Ltd.	14¼—16¼	−½	14¾—15
18,705,480	Stk.	July 25	5⅔	5⅔	Gas Light & Coke 4 p.c. Ord.	17/10½—18/4½f	+-/1½	17/9—18/3
2,000,000	,,	,,	8½	8½	Do. 8½ p.c. max. . . .	61—63	..	61—61½
4,187,030	,,	,,	4	4	Do. 4 p.c. Con. Pref. .	70—73	..	71½—73½
6,888,890	,,	June 13	8	8	Do. 8 p.c. Con. Deb. .	55—58	..	56⅔—58
2,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. .	97—100	..	98½
88,500	,,	Aug. 29	7	7	Hastings & St L. 5 p.c. Conv	98—103	..	..
288,740	,,	,,	5½	5½	Do. 5½ p.c. Conv.	77—82	..	78
10,000	10	Oct. 10	†10	†10	Hongkong & China, Ltd. .	13½—14½*	−½	..
218,200	Stk.	Aug. 29	6	6½	Hornsey Con. 3½ p.c. . .	84—87	..	..
1,978,000	,,	May 30	10	20	Imperial Continental Cap.	390—410	+10	393—403
228,180	,,	Aug. 15	8½	8½	Do. 3½ p.c. Red. Deb.	70—75	..	72
285,242	,,	Aug. 15	7½	8	Lea Bridge 5 p.c. Ord. . .	115—118	..	..
2,145,907	,,	Aug. 15	6½	6	Liverpool 5 p.c. Ord. . .	94—95b	..	..
400,000	,,	Sept. 26	7	7	Do. 7 p.c. Red. Pref.	99—101b	..	..
185,786	,,	Aug. 29	8	9	Maidstone 5 p.c. Cap. . .	122—127	..	123
63,480	,,	June 27	8	8	Do. 8 p.c. Deb. . .	53—56	..	53
75,000	b	June 13	18	110	Malta & Mediterranean Metrop'n (of Melbourne)	5½—6	..	..
892,000	—	Oct. 1	5½	5½	5½ p.c. Red. Deb. . . .	98—99	..	..
641,930	Stk.	May 30	15	19	Montevideo, Ltd. . . .	105—108	..	106
3,061,318	,,	July 25	5⅔	5	Newcastle & Gateshead Con.	16/9—17/3d/f	..	..
682,866	,,	,,	4	4	Do. 4 p.c. Pref. .	71⅞—72⅝d	..	..
691,705	,,	June 27	8½	8½	Do. 8½ p.c. Deb. .	68—69d	..	..
121,780	,,	Aug. 29	7/1/0	7½	North Middlesex 6 p.c. Con	110—115	..	..
900,000	,,	Apl. 24	9	7	Oriental, Ltd.	111—116	−2	112—1 2½
205,162	,,	June 27	8	8	Plym'th & Stonehouse 5 p.c.	110—113	..	..
424,416	,,	Aug. 29	8½	8	Portsm'th Con. Stk. 4p.c. Std.	113—118	..	..
241,446	,,	,,	5	5	Do. 5 p.c. max.	80—83	..	..
3,334,464	1	June 27	—	15	Primitiva Ord.	33/—35/-	+1/6	33/4½—35/3
244,500	100	June 8	4	4	Do. 4 p.c. Red. Deb. . .	92—95	..	..
695,000	Stk.	July 25	4	4	Do. 4 p.c. Red. Deb. 1911	79—82	..	..
416,345	,,	June 27	4	4	Do. 4 p.c. Cons. Deb. . .	79—82	..	81½
150,000	10	Sept. 26	6	6	San Paulo 6 p.c. Pref. . .	8½—9	..	..
1,736,968	Stk.	Aug. 29	6⅔	6½	Sheffield Cons.	108—110e	..	..
95,000	,,	Jan. 10	4	4	Do. 4 p.c. Deb. . . .	74—77e	..	..
90,000	10	June 13	:4	14	South African	4—6	..	4½
5,609,895	Stk.	July 26	7½	5	South Met. Ord.	99—101	+½	99½—100½
500,000	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	106—109	..	..
1,895,445	,,	July 11	8	8	Do. 8 p.c. Deb. . .	54—57	..	55
784,000	,,	Sept. 12	6½	6½	Do. 6½ p.c. Red. Db.	98—100	..	..
91,500	,,	Aug. 15	8½	8½	South Shields Con. . . .	109—111d	+6½	..
1,543,795	,,	July 25	6½	6½	South Suburban Ord. 6 p.c.	102—105	..	103—104
468,887	,,	June 27	5	5	Do. 5 p.c. Deb.	93—96	−2	95
647,740	,,	Aug. 15	5	5	South'mpton Ord. 5 p.c. max	77—80	..	78
131,378	,,	June 27	4	4	Do. 4 p.c. Deb.	70—73	..	..
179,014	,,	July 25	8	8	Sutton Ord.	116—119	..	..
67,828	,,	June 27	5	5	Do. 5 p.c. Deb. . .	90—93	..	..
350,000	,,	Feb. 21	7	7	Swansea 7 p.c. Red. Pref. .	100—102	..	..
900,000	,,	June 27	6½	6½	Do. 6½ p.c. Red. Deb.	100—102	..	..
1,002,475	,,	Aug. 15	6⅔	6⅔	Tottenham District Ord. .	105—108	..	105—106½
150,000	,,	,,	6½	6½	Do. 6½ p.c. Pref.	97—100	..	..
181,365	,,	June 13	4	4	Do. 4 p.c. Deb.	74—77	..	..
389,094	,,	Aug. 29	7	7	Uxbridge, Maidenhead, & Wycombe 5 p.c. . . .	92—98	..	95—96
98,830	,,	,,	5	5	Do. 5 p.c. pref. .	75—80	..	..
80,000	,,	July 11	9	9	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c. .	135—140	..	..
355,686	,,	,,	7½	7½	Do. B 5½ p.c. .	112—117	..	..
429,555	,,	,,	6⅔	6⅔	Do. C and New	95—100	..	..
362,000	,,	,,	7½	7½	Do. Wimbledon 5 p.c. .	105—110	..	..
99,000	,,	,,	7½	7½	Do. Epsom 5 p.c. . .	113—118	..	..
200,000	,,	,,	5	5	Do. 5 p.c. Pref . . .	87—92	..	..
86,416	,,	June 27	8	8	Do. 8 p.c. Deb. . . .	54—57	..	..
284,743	,,	,,	4	4	Do. 4 p.c. Deb. . . .	74—77	..	..
377,550	,,	,,	5	5	Do. 5 p.c. Deb. . . .	93—96	..	..

Quotations at:—a.—Bristol. b.—Liverpool. c.—Nottingham. d.—Newcastle. e.—Sheffield. f.—The quotation is per £1 of Stock. * Ex. div. † Paid free of income-tax. ‡ For year.

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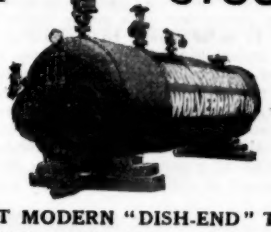
BOILERS

EX STOCK.



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WITH CORRUGATED SECTIONS.

	W.P.	Shop No.
One 30 ft. by 9 ft. 3 ins. by	200 lbs.	6815
One 30 ft. by 9 ft. 3 ins. by	180 lbs.	6862
Two 30 ft. by 9 ft. 3 ins. by	160 lbs.	6848/9
One 30 ft. by 8 ft. 6 ins. by	120 lbs.	6812
One 30 ft. by 8 ft. 6 ins. by	160 lbs.	6826
Two 30 ft. by 8 ft. 3 ins. by	160 lbs.	6871/2
One 30 ft. by 8 ft. 0 ins. by	180 lbs.	6574
One 28 ft. by 7 ft. 6 ins. by	160 lbs.	6785

All the above Boilers are built from "Siemens Martin" Acid Steel.

SUPERHEATERS AND PIPEWORK INSTALLATIONS.

Repairs to all types of Boilers by first-class men.

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(WOLVERHAMPTON) LTD.,

WOLVERHAMPTON, ENG.

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

Strength in Northumberlands and in the Durham screened steam market has been the feature, while all other Durham sorts are decidedly weak. There is very little inquiry about, tonnage is scarce, and many collieries are finding difficulty in keeping the pits working. As regards next year, business is being hampered by the many current uncertainties regarding selling schemes, hours, and the future of wages agreements. The position generally is, therefore, considerably less cheerful than it was earlier in the year.

Wear Special gas coal is quoted at 17s. 6d. f.o.b., and best qualities 16s. 6d. to 16s. 9d. Seconds are 15s. to 15s. 3d. Coking coal is a weak market, and considerable orders are required to improve the position. Best qualities ask 15s. 6d., but quite good brands are obtainable at under 15s. Best bunkers are easy at about 15s. 6d., and seconds are plentiful round 14s. 6d. Best Northumberland screened steams are very strong, and ask up to 16s. 6d. f.o.b.

Gas coke is in very brisk demand, and, with supplies fully taken up, 25s. f.o.b. is asked for shipment.

YORKSHIRE AND LANCASHIRE.

The export trade is slightly stronger; but supplies are good, apart from best hards of which the tonnage is fully taken. In the industrial fuel trade there is little alteration. Washed singles are, however, more easily obtained, and washed doubles are in active request. The furnace coke demand is strong, and recent prices are maintained. Gas coal and rough slacks are in better request; but the demand for coking slacks is not so strong.

The following are the Humber bunker and export prices, f.o.b. usual shipping ports:

South Yorkshire.—Hards, Association, bunkers 19s. 3d., export 18s. to 18s. 6d.; screened gas coal, export 18s. to 18s. 6d.; washed trebles, export 18s. to 18s. 6d.; washed doubles, bunkers 18s. 9d., export 17s. 6d. to 18s.; washed singles, export 16s. 6d.; washed smalls, bunkers 16s. to 16s. 3d., export 15s.; rough slack, 13s. 6d. to 13s. 9d., export 12s. 6d. to 13s.; smithy peas, export 18s. 6d. to 19s. 6d.

West Yorkshire.—Hartleys, f.o.b. Goole, bunkers 17s. 6d., export 17s. to 18s.; screened gas coal, export 18s. to 18s. 6d.; washed trebles, export 18s.; washed doubles, export 16s. 3d. to 16s. 9d.; washed singles, export 16s.; washed smalls, bunkers 15s. 3d., export 14s. 6d.; unwashed trebles, export 17s. 6d.; unwashed doubles, export 15s. to 16s.; rough slack, bunkers 13s. 6d., export 11s. 6d. to 12s.; coking smalls, export 12s.

Derbyshire and Nottinghamshire.—Top hards, bunkers 19s. 3d., export 18s. to 18s. 6d.; cobbles, bunkers 18s. 9d., export 17s. 6d. to 18s. 6d.; washed trebles, export 18s.; washed doubles, 17s. to 17s. 3d.; washed singles, export 16s. to 16s. 6d.; washed smalls, bunkers 15s. 3d. to 15s. 9d., export 14s. 6d.; unwashed doubles, export 16s.; rough slack, bunkers 13s. 3d. to 14s. 3d., export 12s. 6d.

Yorkshire, Derbyshire, and Nottinghamshire.—Screened steam coal, bunkers 17s. to 18s., export 16s. 6d. to 17s.; gas coke, export 22s. 6d. to 25s.; furnace coke 23s. to 24s.; washed steam, Goole (West Yorks.), bunkers 17s. 9d.; Hull (West Yorks.), bunkers 18s.; Hull (South Yorks.), bunkers 18s. 3d., export 17s. per ton.

MIDLANDS.

Trade remains constricted. The demand for house coal broadens only very slowly. Such increase as there is in the requirements of small consumers is scarcely appreciable at the collieries owing to the slackness in other departments. Consumption is being met to a large extent out of stocks. This means that collieries are having great difficulty in enforcing the advances notified three weeks ago.

Industrial qualities sell at late rates. The volume of trade gives no sign of expansion. There is a seasonal increase in the tonnage used in connection with public utility services now that we have reverted to solar time. In particular the requirements of the electricity undertakings help to maintain the balance between the various supplies. Spot lots are comparatively rare. Heavy reserves at the gas-works and ample covering render engineers independent of the market. Contract quotas are being regularly absorbed.

The stringency in coke has not been relieved. Quotations continue to rise slowly. For Yorkshire blast-furnace coke 18s. to 18s. 6d. at the ovens is quoted, while South Wales producers want 19s.; but the amount of coke unsold is very small.

CONTRACTS OPEN.

Gasholder Repairs.

The Cowes Urban District Council invite tenders for repairing a two-lift gasholder. [See advert. on p. 196.]

Lamps.

The Public Lighting Department of the Chesterfield Corporation invite tenders for the supply of street lanterns. [See advert. on p. 196.]

Controllers.

The Public Lighting Department of the Chesterfield Corporation invite tenders for the supply of automatic clock controllers. [See advert. on p. 196.]

Mr. Joseph Rennard retired at the end of September after exactly 41 years' service at the Shipley Urban District Council's gas-works. On Oct. 3, Mr. and Mrs. Rennard, who reside at 42, Windsor Road, Shipley, celebrated their golden wedding anniversary.

Smokeless Fuel for Government Offices.—The Office of Works, it is announced, has placed a large contract for "Coalite" solid smokeless fuel for use in Government departments. This fuel will be used mainly at the Admiralty and the War Office.

Cast-Iron Pipe Merger.—A partial scheme of rationalization in the cast-iron pipe industry of Yorkshire and Derbyshire is indicated in the fusion of the centrifugal castings business of Newton, Chambers, & Co., and that of the Sheepbridge Stokes Company.

Bakewell Gas Exhibition.—The Bakewell Urban Council have expressed their high appreciation of the services of the Gas Manager (Mr. T. W. Tiplady) in organizing the recent gas exhibition, which was a great success, and resulted in a large number of orders for gas cookers, fires, &c.

Gas Appliances Exhibited at Glasgow.—At the Housing and Health Exhibition at present being held at Glasgow, Messrs. Allied Ironfounders, Ltd., of Falkirk, and their associated companies, have on view on their stand various exhibits of gas appliances, including cookers, fires, wash-boilers, &c.

Price Reduction at Earby.—The Earby and Thornton Gas Lighting Company have reduced the price of gas by 6½d. per 1000 c.ft. The price for lighting is now 4s. 5½d. per 1000 c.ft., and for power 3s. 8½d. per 1000 c.ft. There is a reduction in calorific value of 25 B.Th.U., but this covers less than half the reduction in price.

Great Yarmouth Stock Issue.—As will be seen from our advertisement columns, Messrs. A. & W. Richards, of 37, Walbrook, E.C. 4, are offering for sale on behalf of the Directors of the Great Yarmouth Gas Company, £10,250 5½ p.ct. perpetual debenture stock at a minimum price of issue of par. Applications should be received not later than Thursday, Oct. 17.

The Year's Results at Ballymena.—The auditor's report on the Ballymena Gas-Works accounts, for the year ended March 31, shows an increase in consumption of 3,363,854 c.ft. over the preceding year. The increased revenue from the total consumption only realized £326 owing to a reduction in the price of gas. There was a gross profit for the year of £3196, against £2880 for previous year, and a net profit of £38, against a deficit of £78 in the previous year. At the last meeting of the Urban Council, the Chairman (Mr. P. Murphy, J.P.) said the credit for that encouraging report was due to Mr. Surman, the Gas Manager.

Swinton Public Lighting.—We are glad to learn that we were misinformed about the public lighting of Swinton when we stated in our issue last week that the Swinton Urban Council had decided to use electricity entirely for their street lighting. As a matter of fact, the question was the main street lighting only, which is at present done by electricity. The Swinton and Mexborough Gas Board had been asked to quote a price for displacing electricity, but owing to the cost of the gas lamps the Swinton Council decided to retain their electric lighting. There are only 49 electric lamps used in the streets of the Swinton Urban area, as against about 230 gas lamps.

Public Lighting at Birtley.—Birtley's application to the Ministry of Health for permission to borrow £2600 to change the lighting of the town from gas to electricity has not met with the success hoped for. The Ministry, in a letter read at a meeting of the Council, state that, though they approve the proposals of the Council in principle, they are of the opinion that the Council should further explore the respective merits of the alternative means of lighting, and suggest that the Council reconsider the whole matter. The Clerk (Mr. F. Ridley) said that, in response to the invitation, he had interviewed the Ministry's representatives on the proposal, and replied to various objections. He claimed that the Council's scheme was the best, having regard to all the circumstances, and if adopted would prevent gas consumers becoming subject to a monopoly by the gas company. It was decided to press the application.

Gas Light and Coke Company and Westminster Lighting.—At the last meeting of the Westminster City Council, the Traffic and Public Lighting Committee reported that the contracts with the Gas Light and Coke Company for public lighting remained in force from year to year, unless and until determined by twelve calendar months' notice in writing by either party, the notice to expire on any day of any year. The City Engineer was instructed to negotiate with the Company with a view to obtaining more favourable terms, but the Committee had received a report that the Company were not able to make any reduction in the contract rates. Under the contract the Company's charges were subject to an addition or deduction of 3½ p.ct. for every penny by which the standard price of gas supplied for public lighting exceeded or was less than 2s. 6d. per 1000 c.ft. The City Engineer expressed satisfaction with the manner in which the contract was carried out, and the Committee reported their approval of its continuation.

The Gas Engineer has reported to the Plymouth Corporation Gas Committee that the output of gas during July showed an increase of 9·55 p.ct. over the corresponding month of last year, and during October an increase of 8·12 p.ct.

The Eckington (Derbyshire) Council have decided to extend the gas lighting services for streets and houses in the coming winter, and they have asked the Eckington and Mosbro' Gas Company to undertake the scheme.

The demand upon the Birmingham Corporation Gas Department for gas fires and cooking stoves is phenomenally heavy, and is easily a record in the history of the Corporation undertaking. A huge army of gas fitters is working overtime to cope with the rush. This year a new type of enamelled cooker, which is available on the hire-purchase system, is meeting with a large measure of popularity.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication but as a proof of good faith.

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